Car No.

Registration No.

OWNER:

License No.

Wolseley

The Wolseley Motor Vehicle Handbook.

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Being

Hints and Directions on the Care and Management of the Wolseley Motor Vehicles.

PRICE: THREE SHILLINGS AND SIXPENCE.

The Wolseley Tool and Motor Car Co. Ltd.,

Works, Adderley Park,

Birmingham.

AND AT

Crayford, Kent.

LONDON OFFICE:
32, VICTORIA STREET, W.

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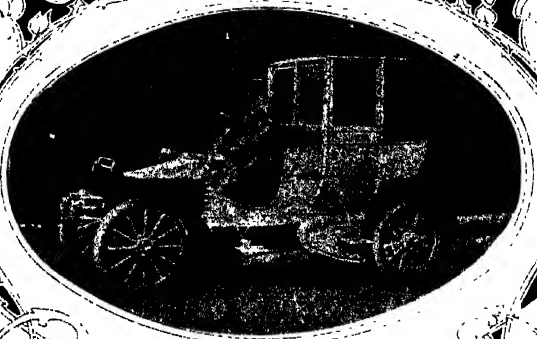
Index.



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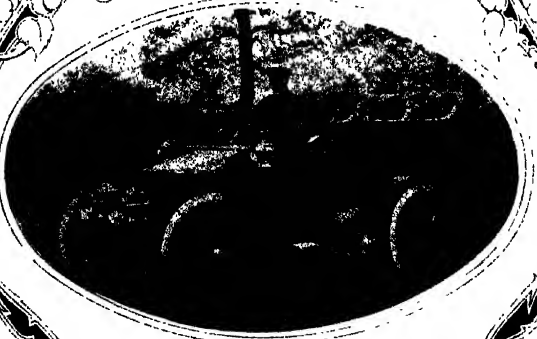
24-H.P.



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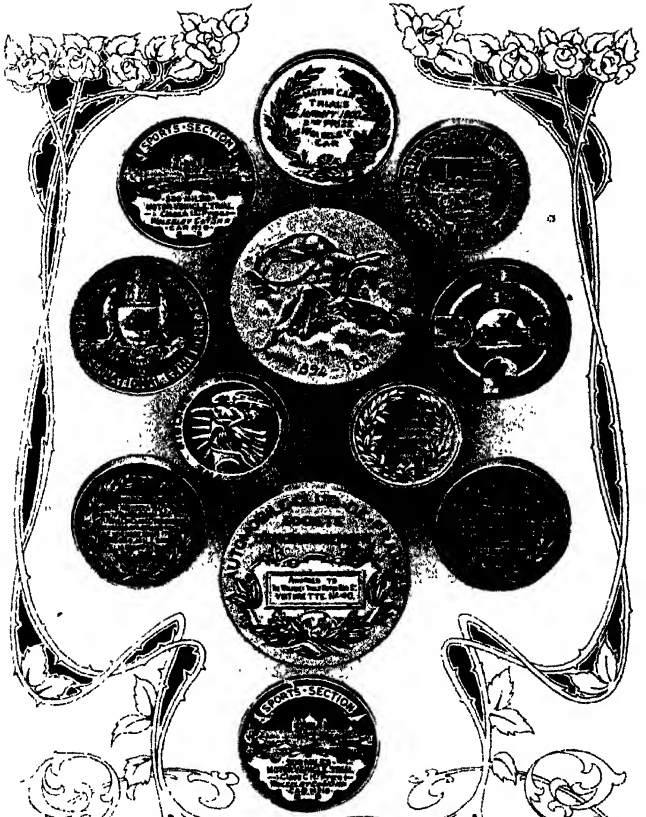


FAC-SIMILE REPRODUCTIONS
OF SOME OF THE MEDALS AWARDED TO
WOLSELEY MOTOR VEHICLES.

List of Awards.

1900.

Midland Cycle and Motor Car Exhibition—
SILVER MEDAL.

1,000 Miles Trials A.C.G.B.I.—
SILVER MEDAL
(Highest Award in its Class).

1901.

500 Miles Trials A.C.G.B.I.—
TWO GOLD MEDALS.
One for each Car entered
(Highest Awards in each Class).

1902.

(August) Welbeck Speed Trials—
SILVER MEDAL.

650 Miles Trials A.C.G.B.I.—
TWO GOLD MEDALS
(Highest Awards in each Class).

List of Awards.

1902.

The Midland A.C. Hill Climb—
TWO GOLD MEDALS and
ONE SILVER MEDAL.
Salon de l'Automobile, Paris—
GOLD MEDAL.

1903.

Scottish A.C. Hill Climb.
Glasgow-London Non-Stop Run.
Sheffield A.C. Hill Climb.
Lincoln A.C. Hill Climb.
Midland A.C. Hill Climb.
Johannesburg (South Africa) A.C. Hill Climb.
1,000 Miles Trial A.C.G.B.I.—
SILVER MEDAL.
Salon de l'Automobile, Paris—
TWO BRONZE MEDALS.

1904.

Glasgow-London Non-Stop Run—
GOLD MEDAL.
Derby A.C. Hill Climb—GOLD MEDAL.

INSTRUCTIONS

IN compiling a book of this description it is difficult to convey to car owners, and especially those who have but little knowledge of mechanics, the importance of the various details embodied in the construction of a self-propelled carriage, and at the same time to avoid making the description complicated and of too technical a nature to be readily understood. We have, therefore, confined ourselves to describing in simple language the functions of those portions of the mechanism which should be understood by every owner and driver.

In the event of any portion of the description not being sufficiently clear, further information will be gladly given by ourselves or any of our representatives (see pages 135-8).

We may say that the assistance, as instructor, of someone who thoroughly understands cars and their mechanism is almost essential to enable one to learn how to properly look after a car. Should the services of an expert be unavailable, very much more care will be needed in acquiring this knowledge in order that serious mistakes may be avoided. To ensure satisfactory running and freedom from breakdowns, purchasers who cannot spare the time to overhaul and keep in order their own cars should obtain the services of an experienced mechanic; or, failing this, have one of their servants trained in our works. It is, of course, impossible to make mechanics of them in two or three weeks' time, but they have the opportunity of acquiring a practical knowledge of how the motor, gearing, brakes, etc., are fitted and adjusted, and how to effect any small repairs that may be required from time to time.

General Remarks.

Storage.

The first two questions a purchaser must consider are "Where to put the car?" and "What amount of room will be required to store it satisfactorily?" Those people who have stables will as a rule use their coach-house for the purpose, but as there is nothing offensive about a car, in the event of a special house having to be built for it, this can be placed quite close to the owner's house. The motor house must be dry, well ventilated, to prevent any possibility of fumes from the petrol collecting and forming an explosive mixture, and arranged so that it can be heated during the cold winter months. The dimensions of this building may be anything above 12-ft. by 8-ft., this being taken as the minimum space in which a car may be properly housed.

Cars, such as the "Berkeley Waggonette," etc., fitted with omnibus tops and canopies,

or made with extra long wheel base, will require proportionately larger houses. An inspection pit may be provided if preferred, but this is not absolutely necessary in connection with WOLSELEY CARS, as the working parts are arranged so that they can be conveniently got at.

During the winter months it is most important that the car should be stored in a warm house when not in use, or failing this, that the cooling water should be drained from the radiator and cylinder jackets, as, if the water should happen to freeze in them, very serious damage to the motor may result.

Smoking in the motor house must be strictly prohibited. A supply of sand should be provided and placed so as to be at once available in the event of petrol catching fire; water is of very little use for extinguishing purposes, as the burning spirit, being lighter than water, floats on top and spreads the flames.

Petrol Storage.

Petrol should be stored in a separate building by itself. A suitable shed can be erected of corrugated iron at the cost of a few shillings. It is advisable to fill the petrol tank when the car is outside the motor house. Care must also be taken to see that the filling hole in the petrol tank is kept closed when not in use, and that the tank is not overfilled. These precautions should be strictly observed on account of the inflammable nature of motor spirit and consequent danger from fire.

Lubricating Oil.

Lubricating oil should be kept in a steel drum, of about 10 gallons capacity, and provided with a cock so that it may be drawn off as required. A funnel fitted with a strainer should be used. Needless to say, dirt should be carefully guarded against.

Overhauling.

It is advisable to have in the motor house an engineer's bench fitted with a parallel vice, and provided with a few tools so that adjustments and small repairs may be done at once, instead of being neglected and only taken in hand when absolutely necessary. "A stitch in time saves nine" is particularly true in respect to a motor car, and many serious accidents might have been avoided had a little timely care been expended in keeping the various parts of the mechanism in proper working order.

Lamps, tools, spare parts and other small articles should be stored in lock-up cupboards when not in use.

Cleaning.

The importance of always having their car properly cleaned after a run, is recognised by the majority of car owners, but there are others who apparently fail to recognise the fact that a car will depreciate very rapidly in value by not being properly attended to in this respect. Mud is allowed to dry on the paint-work instead of being washed off immediately the car has returned to the coach house. The motor casing and gearing gets coated with grease and dust, and the car rapidly puts on a dirty and "second-hand" appearance. On the other hand a car which receives proper care and attention will after running many thousands of miles, look almost as well as it did the day it left the works.

The following instructions indicate the best manner of cleaning the various parts

of a car. Whilst this is being done the air bottle should be closed, the petrol tank cover screwed down, and lubricators shut off.

The various utensils and cloths should be stowed away when not in use in places specially assigned to them so that they may be found whenever they are required, and no danger of using greasy cloths for cleaning the carriage body can arise.

Body Work.—To remove dust from the paint work, a large painter's brush is as good as anything; but in muddy weather a soft sponge with plenty of water should be used. The sponge should be plunged frequently into water and "dabbed" on the mud; do not attempt to wipe it off, as this will scratch the varnish. When every vestige of dust or mud has been removed the body should be wiped down with a soft chamois leather. Neither the brush, sponge, or leather used for the carriage body should be allowed to become greasy, or they will spoil the gloss of the varnish.

Motor.—A little paraffin oil used on the cloths when cleaning the engine greatly facilitates the removal of grease. To clean the side chains use paraffin well brushed in with a paint brush. Separate cloths and leathers should be used for the motor, transmission gear, and other greasy portions of the mechanism, these parts being finished last. Care must be taken to see that no grit or dust is wiped into the bearings.

Wheels and Tyres.—All dirt should be washed off the tyres, and after being thoroughly dried, any cuts should be cleaned out with benzine or petrol, and then plugged and cemented with pieces of pure rubber and solution, allowing as much time as possible to harden before being again used. Several patent preparations are sold for this purpose, some of which are very useful. *On no account should a deflated tyre be allowed to support the weight of the car.* If it is not convenient to repair a tyre at once,

the weight of the car should be taken off it by a "jack" or other support. The fly nuts holding the tyre cover to the rim should be kept screwed up tightly. It is very detrimental to the fabric of tyres for them to stand on greasy patches, and, as it is almost impossible to prevent oil dropping from the mechanism of the car we advise owners to have a sheet-iron tray made about five feet long by three feet wide, with sides about one inch high, and slide this underneath the car as soon as it has been "housed."

Axle Bearings.—The WOLSELEY system of ball bearing provides ample surface with very free running. The hubs should be examined after every run and will require greasing about once a week. No trouble should be experienced with them, provided they are kept properly lubricated, and adjustment will only be needed after very long use.

Finishing.—Oil reservoirs and grease lubricators must be examined to see that they are working properly and replenished in readiness for the next run, brakes will need examination, if the car has been run over rough roads some of the nuts may have shaken loose and will need tightening. It is very important to see that the cotter pins which secure most of the nuts in position have not shaken out, as the nut will then probably work itself loose and cause trouble through the portion of the mechanism which it secures coming adrift. When the car has been thoroughly washed and cleaned wipe over the bright plated parts with a rag having a little vaseline on it. Give the side chains a coating of tallow and blacklead, which can be kept ready mixed, and applied with a brush similar to that used for cleaning purposes.

To describe in detail the correct method of cleaning a car doubtless gives an impression that it takes a great deal

of time to do, but it is surprising how quickly a car can be cleaned if the few necessary appliances are kept in readiness for use. The care and time spent in the methodical cleaning of a car after every run in the manner we describe is more than repaid by the absence of trouble and worry, and the comfort of knowing that all is right beneath one when riding along the road.

SUMMARY.

1.—Clean the car as soon as possible after returning from a run.

2.—Keep separate cloths, etc., for cleaning carriage work to those used for the motor. A greasy cloth will quickly spoil paint work.

3.—To prevent rust, always wipe bright and plated parts with a rag having a little vaseline on it, after they have been cleaned and polished.

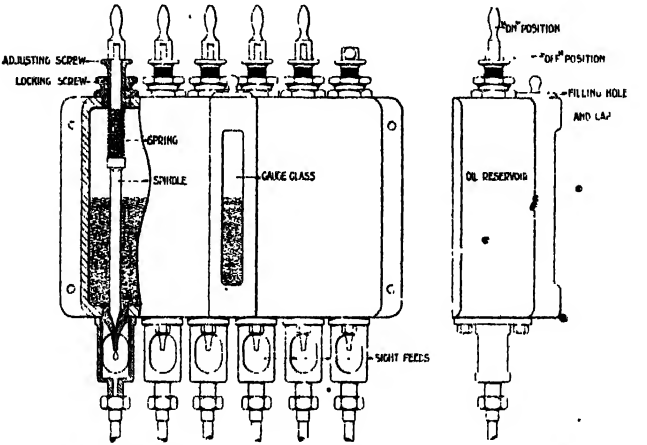
4.—Keep the floor of coach-house clean and free from oil.

5.—Never let a deflated tyre support the weight of the car.

6.—Have a heap of sand and a shovel in readiness for immediate use in case of fire.

Lubrication.

Efficient lubrication of machinery is essential to its proper working, and in the case of a car, it is of the utmost importance that the motor and bearings shall



VIEW SHOWING DETAILS OF WOLSELEY LUBRICATOR

receive careful and regular attention in this respect. Other troubles may be experienced in connection with ignition, water circulation, tyres, etc., but these are

comparatively trivial to the damage which will result from a bearing which has run hot and seized. For this reason the oil supply to main bearings has been so arranged as to be directly under the supervision of the driver whilst travelling. Reservoirs fitted with gauge glasses to indicate the contents, and provided with independent "sights" to each supply pipe, are attached to the dashboard of the car in such a position that the driver may see from his seat that each bearing is getting its proper supply of lubricant. Price's Gas Engine Oil is used during the winter and in the cooler seasons of the year for all main bearings, but in hot weather the use of a heavier oil is preferable, such as the No. 1 Mobiloil prepared by the Vacuum Oil Co.; both of these are good reliable lubricants, and may be obtained in most towns throughout the country. It will be necessary when changing from one grade of oil to the other to adjust the lubricators

so that they give the necessary number of drops per minute to each bearing.

Motor.

All bearings on the motor itself will of course get warm owing to the heat conducted through the casing from the water jacket round the cylinder, but it should be possible at any time to keep the hand on the crank bearings and second speed shaft bearings. Overheating of the connecting rod bearing on the crank shaft or "big end" is a very serious matter and is usually indicated by the motor pulling sluggishly and the bearing squeaking. This must be attended to without delay. Take the inspection cover off the crank chamber and cool the bearing by pouring oil on to it (never use water for this purpose), then disconnect and examine the lubricator pipe to see if it is feeding the bearing with its proper supply of oil. It may happen in a bad case of overheating that the "brasses" of the

bearing will seize on the crank shaft and score it. The bearing must then be taken adrift when cool and the shaft carefully scraped and smoothed with a fine file and emery cloth, and new brasses fitted. No emery should be allowed to get into the oil holes which feed the bearing. If this repair is necessary on the roadside, the old brasses will probably have to be replaced and the car run slowly until a permanent repair can be effected at the nearest Garage. Those requiring the greatest amount of lubrication, are the crank shaft and piston bearings, a failure of the oil supply to these points, unless attended to immediately, will very quickly be the cause of serious trouble. Duplicate diagrams to those inserted in this book are supplied with each car showing the correct number of drops per minute for each bearing, and the lubricators are set accordingly, before the car leaves the Works. After three or four months' use the supply

might be reduced to some of the less important bearings, but this is an adjustment which should only be made by an expert, and anyone in doubt and unable to secure reliable advice should keep to the original number of drops and put up with the slight extra expense. In cold weather the oil will become thicker and may at times require to be thawed. This is done either by pouring hot oil into the reservoir or applying outward heat (flannel soaked in hot water). On the contrary, during hot weather the oil becomes thinner and the adjusting screws will then require screwing down a little to prevent the oil dropping too fast. If any of the sight feeds on the reservoir to which the oil pipes are connected should become full of oil, it indicates that the pipe leading from it is blocked, this should at once be detached and cleared. To do this uncouple the pipe at each end, remove it from the car, and thoroughly

wash out with paraffin or petrol. The connection through the crank or gear casing to the bearing must also be examined and cleaned. In the event of two or more pipes requiring removal at the same time they must be marked so that no mistake shall be made in putting them back. The oil which accumulates in the bottom of the crank chamber should be drained away after each run, but many people prefer to keep the drain tap open all the time they are running, and shut it only when the car is stabled. This is a very good plan when on a long journey, but is not to be recommended when a car is used in town, as it makes an unsightly mess of dirty oil in the roadway wherever the car may stop for any length of time.

Gear Box Bearings.

The gear box bearings fed from the oil reservoir on dashboard are not likely to give trouble so long as they receive a fair

amount of lubrication; when examining them after a run they may be found to be slightly warmer than the hubs, but unless they get too hot for the hand to be held on them no harm is likely to result.

Hubs.

The bearings and hubs of the road wheels should be felt from time to time during a run to see that they are keeping cool; in the case of a wheel bearing running hot, the hub caps should be removed and the bearing examined. Apart from want of grease, it may happen that the adjusting nuts are screwed up too tightly and are not giving the hub sufficient side play. There should always be about one-sixteenth of an inch movement on these wheels. To detach a wheel from the axle the nuts will have to be removed; the outer one, which is the lock nut, is screwed left-handed, this should be

remembered when removing as it will have to be turned the reverse way to a right-handed nut. Small cars are provided with one nut only, which is right-handed. When replacing the wheel care must be taken to see that the ball bearings are in correct position, and the hub and spindle should be liberally supplied with grease; after the lock nuts have been replaced a cotter pin should be inserted in the hole provided for it. This is of great importance.

Grease Lubricators.

Those bearings which are not lubricated from the dashboard are the clutch, steering gear, contact breaker, pump, and front wheel swivel axles. These do not require such constant attention and are therefore fitted with grease lubricators, which should be filled at intervals, as may be required, with a high-grade lubricating grease of medium consistency.

Give a turn to the caps of these

lubricators every time before starting out, and an occasional turn in the course of a long run. The clutch bearing is one of the most important, and when the car is used much in traffic, necessitating the clutch being held out of gear fairly often, this bearing will require proportionately more grease.

SUMMARY.

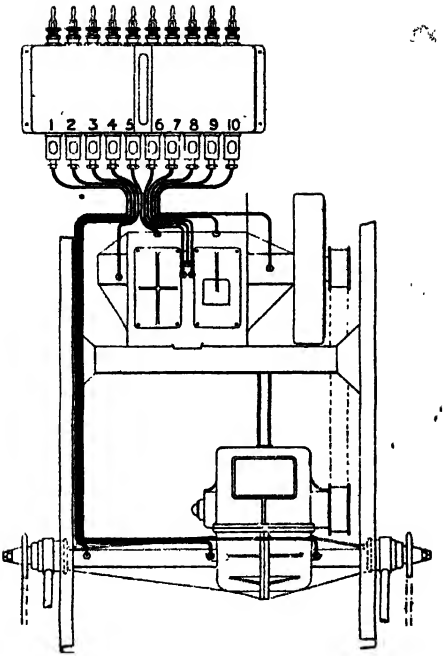
1.—During hot weather a fairly heavy oil should be used for main bearings, but in cold weather a lighter oil is more suitable. In both instances the oil must be of the best quality.

2.—Turn up levers on lubricators, and give the caps of the grease lubricators a turn before starting motor.

3.—See that each bearing is receiving its right number of drops.

4.—See that none of the pipes are stopped, broken or detached.

5.—Examine bearings regularly after each run.



LUBRICATING DIAGRAM FOR
2 CYLINDER MOTOR
12-H.P.

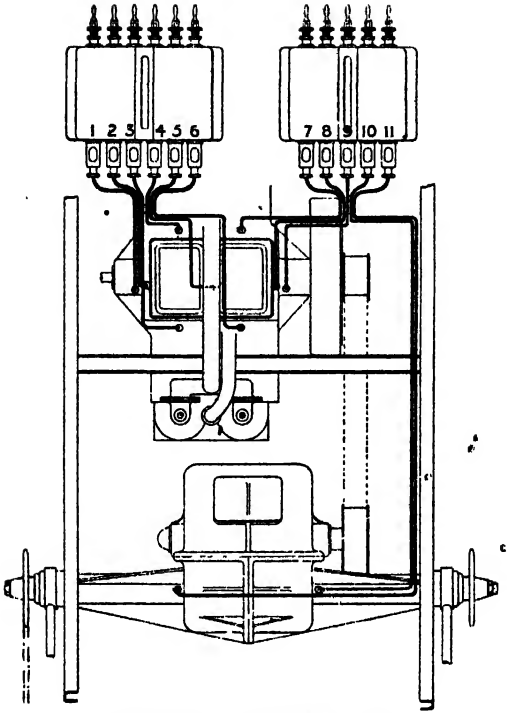
Lubricating Diagram for 9-h.p. Car.

No.	Reference.		No. of drops per minute.
1	Gear Box	Near Side	3
2	„ „	Middle	3
3	„ „	Off Side	5
4	Crank Shaft	Near Side	5
5	Piston		20
6	Crank Pin		20
7	Piston		20
8	Crank Shaft	Off Side	5

The table above gives the correct supply of oil to bearings on the 9-h.p. car. The numbers are counted from the near side of car as in the 12-h.p. diagram, but do not necessarily lead to the same bearings.

Lubricating Diagram for 12-h.p. Car.

No.	Reference.		No. of drops per minute.
1	Gear Box	Outer Bearing	6
2	„ „	Inner Bearing	5
3	„ „	„ „	5
4	Crank Shaft	Near Side	5
5	Piston		20
6	Crank Pin	Near Side	15
7	Middle Bearing		7
8	Crank Pin	Off Side	15
9	Piston		20
10	Crank Shaft	Off Side	6



LUBRICATING DIAGRAM FOR
4 CYLINDER MOTOR
24-H.P.

Lubricating Diagram for 16-h.p. Car.

No.	Reference.		No. of drops per minute.
1	Crank Shaft	Near Side	5
2	Crank Pin	,, ,,	25
3	Front Piston	,, ,,	20
4	Rear Piston	,, ,,	20
5	Crank Shaft	Middle	8
6	Front Piston	Off Side	20
7	Rear Piston	,, ,,	20
8	Crank Pin	,, ,,	25
9	Crank Shaft	,, ,,	5
10	Gear Box	Near Side	3
11	,, ,,	Middle	3
12	,, ,,	Off Side	3

The table above gives the correct supply of oil to bearings on the 16-h.p. car. The numbers are counted from the near side of car as in the 24-h.p. diagram, but do not necessarily lead to the same bearings.

Lubricating Diagram for 24-h.p. Car.

No.	Reference.		No. of drops per minute.
1	Crank Shaft	Near Side	6
2	Piston		25
3	Crank Pin		20
4	Piston		20
5	Middle Bearing		9
6	Piston		20
7	,,		20
8	Crank Pin		25
9	Crank Shaft		8
10	Gear Box		3
11			

Cooling System.

The principal advantage of the WOLSELEY cooling system lies in the fact that all the water is carried above the motor, which greatly assists a continuous and regular circulation. Should the pump fail at any time, and it is not convenient to repair it immediately, the vanes which slide in the head of the pump spindle may be removed and the pump-cover replaced, when the water will circulate on the thermo-syphon system. It will of course get hotter than if the pump was in use and may require frequent replenishing, but this arrangement will enable the car to be run to a suitable place for a permanent repair to be effected. Every two or three months the cover of the pump should be removed, one or two of the lower pipe connections uncoupled, and the water system thoroughly flushed out. This

may easily be done by passing the end of a hose into the top of one of the radiator bottles and sending a good stream

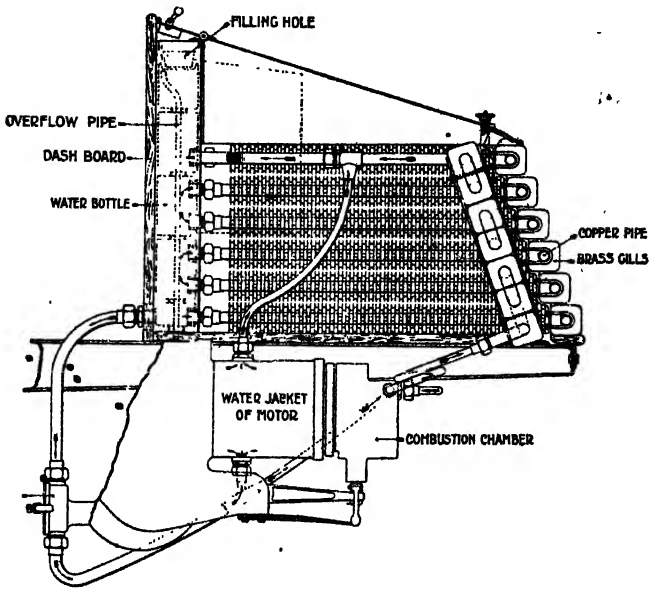


DIAGRAM OF COOLING SYSTEM.

of water through the pipes. When refilling the radiators the water should be passed through a tundish, it may be put

in at either bottle which should not be filled higher than three inches from the top. In each bottle is a small copper tube provided as an outlet for any steam that may accumulate, and in the event of the bottles being quite filled and the tops put on these tubes might form a syphon and empty most of the water out again; this rarely happens, however, but should it be noticed that the water is running away it can be at once remedied by unscrewing the cap of the bottle to destroy the vacuum and replacing it again immediately afterwards. The bottles, which are made from an aluminium alloy are not likely to give any trouble, but in the event of a leak occurring this can only be stopped by "caulking," viz.:—closing up the crack or hole by gently knocking the soft metal with a blunt ended chisel. This trouble is not likely to arise except as the result of an accident, and needs care to make a successful job of the repair.

During frosty weather all water must be drained from the motor jacket and cooling system when the car is not in use.

For this purpose a drain tap is fitted in the breech end of the motor, and another at the lowest portion of the piping. The pump cover should be taken off and the water bottle caps removed. Some owners prefer instead of draining off the water to add 30 per cent. of glycerine in winter time to prevent it freezing, this has been found to be fairly effective, as the glycerine does not waste away, and it is only necessary to refill the water lost through evaporation from time to time. Should the water, however, get boiling hot the glycerine will decompose and will then require renewal.

Pump.

This is affixed to the crank chamber casing of the motor and worked from the half speed motion shaft by means of spiral

gearing. The construction of the wearing parts of the pump have purposely been made as simple as possible. The spindle is grooved at one end and carries two vanes which are held in position by springs placed between them; these vanes force the water through the circulating pipes as they rotate. The cover is held in position by means of a cramp and one set screw, so that it may be easily removed for examination at any time. When filling the water tank, clean water only must be used, free from straw or any other foreign matter which may cause trouble by choking the pipes or working through into the pump chamber.

SUMMARY.

1.—Use clean water, free from salt or soda.

2.—See that the water does not syphon out again after filling tanks.

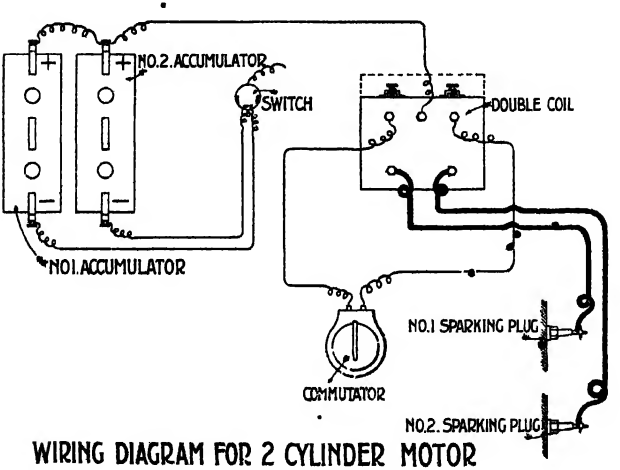
3.—Never leave water in the pipes during frosty weather when the car is not in use.

4.—Flush the pipes out periodically.

5.—Examine pump occasionally, and keep spindle well supplied with grease.

Ignition.

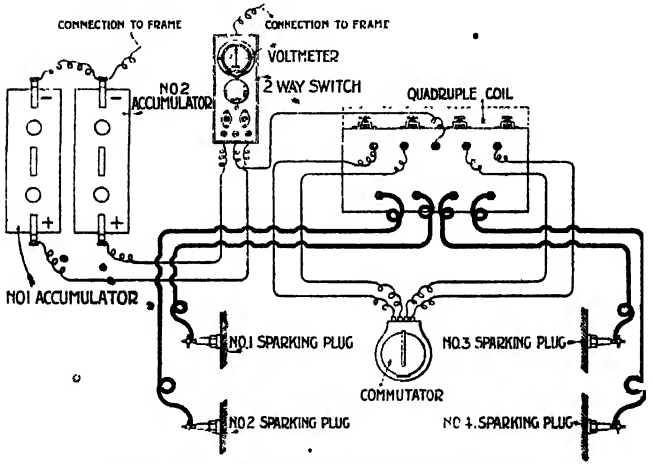
Electricity has become the recognised method of firing the charge in a motor cylinder; tube ignition, which was formerly used by many manufacturers, having been discarded on account of the danger from



WIRING DIAGRAM FOR 2 CYLINDER MOTOR

fire, and also the inability to adjust the time of the explosion according to the speed of the motor. The method of electrical ignition in general use is the high tension

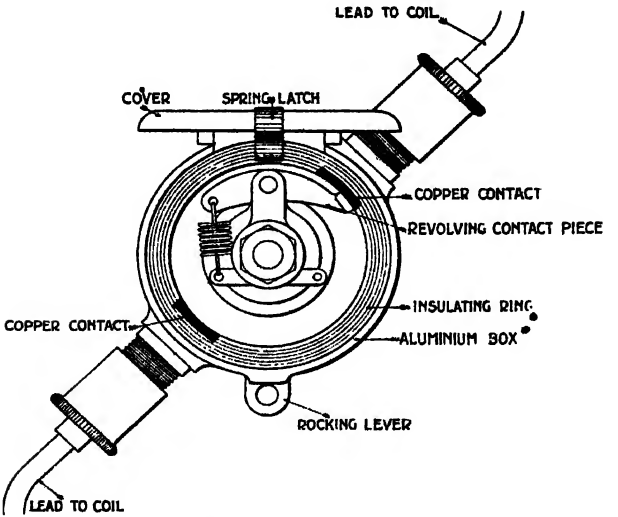
system in which the current is supplied from an accumulator, passed through an induction coil to intensify it, and thence conveyed to the sparking plug fitted in the combustion chamber of the motor. As will be seen from



WIRING DIAGRAM FOR 4 CYLINDER MOTOR.

the annexed diagrams the arrangement is extremely simple. From the "negative" pole of the accumulator a wire leads to the switch which is also connected to the frame work of

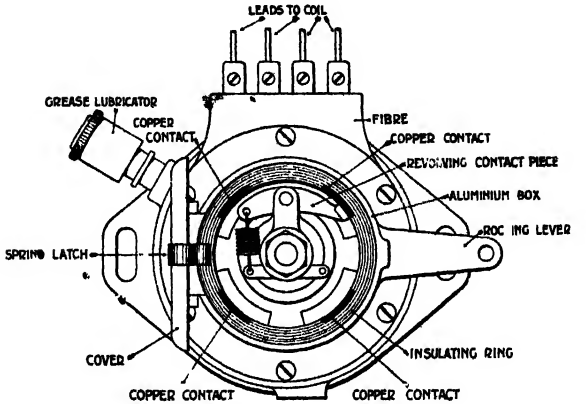
the car, or in technical language, "Earthed." From the other, or "positive" pole of the accumulator, a wire leads to the induction coil, from which connections are also



DETAILS OF COMMUTATOR FOR 2-CYLINDER MOTOR

made to the sparking plug and commutator (which is a mechanically operated switch worked directly from the motor). The commutator is controlled by a lever attached

to the steering pillar and driven by the half speed shaft which works the exhaust valve cam and also drives the pump. It is given sufficient play on this shaft to allow of its



DETAILS OF COMMUTATOR FOR 4 CYLINDER MOTOR

being set at any desired position in relation to the firing stroke of the motor, and by this means the driver is enabled to control the time of ignition and speed of the motor.

It is in connection with the electrical outfit that most of the little troubles and delays which attend the novice occur. It is of the first importance that all wiring and contacts should be kept clean and in good order. No tools or metallic articles should be permitted to foul the contacts or be stowed away in the accumulator box. The wiring should be kept dry and as free from oil as possible to avoid the liability of the current "short circuiting," which would cause the motor to misfire and possibly stop it working altogether. Some owners have adopted a very good plan of entirely re-wiring their cars at stated periods, say every six months, in order to avoid trouble through the insulation wearing, getting soaked in oil, etc.

Taking the system in detail we will now describe the functions of the various parts and the precautions to be observed in respect to them:—

Accumulator.

The accumulator should be tested occasionally for capacity and when it shows signs of running down must be at once re-charged.

All cars above 6-h.p. and 9-h.p. are supplied with two sets of accumulators, one being carried in reserve. An accumulator consists of two cells coupled together in series, *i.e.*, the negative pole of one cell is coupled to the positive pole of the other; which is done in order to obtain the necessary voltage. Cells are constructed of lead plates pasted with a composition and placed in a box made from acid-proof material, this is filled with a 10 per cent. solution of sulphuric acid (care must be taken to use chemically pure acid and distilled water only). They are then charged with current at 5 amperes × 5.5 volts for a period of from 8 to 10 hours, or until the voltmeter shows a reading of 5.4 volts, beyond which point charging should not be proceeded with. It will be noticed that, when disconnected from the

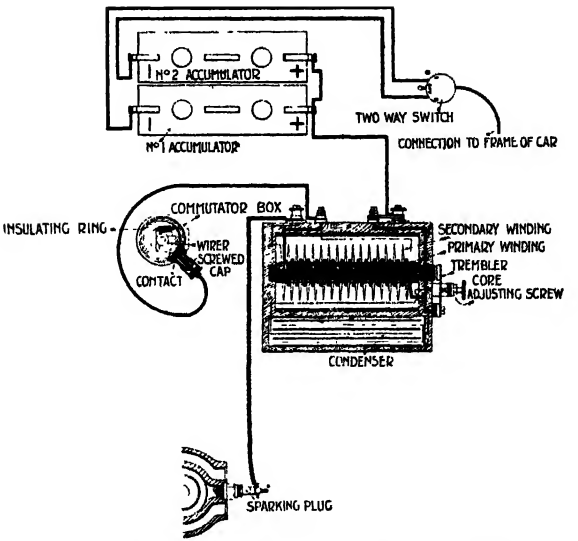
charging leads, the voltage will gradually drop to about 4.4, at which point it will stay for a considerable time. The capacity of the accumulator is equal to approximately 1,000 miles travelling for a single cylinder car; it should be tested occasionally by means of a voltmeter and when the reading drops to 3.8 volts it is necessary for it to be re-charged.

To use the voltmeter connect the point marked + on the instrument to the + terminal of the accumulator, and the other — point to the — terminal. Should no reading be obtainable it indicates that a connection is broken somewhere. This may be in the voltmeter itself, which should then be tested on another cell; but, should the fault be in the accumulator, it will have to be returned to the makers for repair.

Drawing sparks between the terminals by connecting them with a metal instrument, such as a file or screwdriver, will rapidly discharge the accumulator and may cause serious injury to the plates.

Sparking Coil.

In a convenient position on the dash-board is placed the coil, the construction



DIAGRAMMATIC VIEW OF ELECTRICAL CONNECTIONS

of which may be roughly described as follows:—

The centre consists of a core built up of soft iron wires round which is wound several turns of stout insulated copper wire, which is called the primary winding, the two ends of this wire are brought to two terminals fitted on the wooden casing; a secondary winding is now made of very many turns of fine copper wire, the ends of this wire being also brought to two terminals on the casing. The coil is then thoroughly well insulated by dipping it in a bath of melted paraffin wax, followed by being bound up in oiled silk; a condenser is then wound on the coil (which consists of a number of turns of alternate tinfoil and paraffined paper), and connected to the primary winding. The condenser serves the purpose of a reservoir for the electric current and also reduces the amount of sparking which takes place at the platinum points on the trembler, it also renders the coil more efficient at high speeds. The fittings on the outside of the wooden case consist of the

trembler and the various terminals to which the leads for commutator and sparking plug are attached. The sequence of operations is then as follows: Before starting the motor the switch is closed and the completion of the circuit is then automatically controlled from the rotary contact in the commutator. Directly the circuit is completed a strong magnetic action is set up in the coil which draws the trembler blade down and breaks the primary circuit from the battery, this action induces a highly intensified current through the secondary winding which is conveyed from the coil by a heavily insulated wire to the sparking plug, the return circuit being completed through the framework of the car; it must be borne in mind that the coil is a very delicate piece of mechanism and should on no account be tampered with, the only point requiring attention from time to time being the adjustment of the trembler. This should always give out a high note

when buzzing, a low note indicating that it is working too slowly. When testing this, the wire to the sparking plugs must always be connected up, as, if the coil is worked without the secondary circuit being completed, serious injury may result to it. The following are some common causes of ignition failure :—

No. 1. Sparking Plug.—The platinum points may need adjustment, the proper distance apart for these being barely 1/16th of an inch. The porcelain may be cracked, in this case a new plug must be fitted. The platinum points may become oily and sooty, which indicates that too much oil is being fed to the pistons; that a piston ring is broken, thus allowing the oil to work its way back into the combustion chamber; or the air supply to carburettor needs adjustment. The first remedy is to reduce gradually the supply of oil to the piston, and in the case of a broken ring to replace it with a new one, the plug must then be

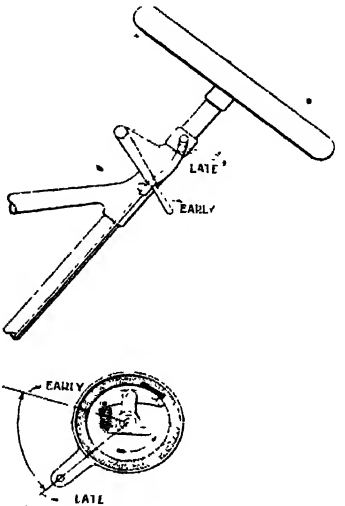
cleaned; a good method of doing this is to wash it in petrol and then apply a light to it, the dirt can afterwards be very easily wiped off with a piece of rag. Before replacing the plug lay it on the "breech end" or combustion chamber, taking care that only the end that screws into the chamber is making contact, and connect up to the coil, then turn the motor round by hand until contact is made at the commutator and observe if the spark is passing properly from one point to the other. The insulated portion of the plug must always be kept quite clean and free from water or grease.

No. 2. Contact Breaker (Commutator). Oil may have worked its way into the box and thus caused a "short circuit," or the fibre ring may be too greasy and dirty, this should have only just sufficient lubrication to enable it to work easily and without undue friction. This ring may become swollen owing to damp, and will need to be carefully scraped away where it binds, paying

special attention to either side of the contact piece, as if it is not scraped away sufficiently on either side of this the wiper will jump when the engine is running fast. Listening for the buzz of the coil is the simplest means of ascertaining whether the commutator is working properly. Turn the motor slowly round by hand and notice whether the coil "buzzes" each time contact is made.

It may happen that the set pin, which pegs the commutator in position on the shaft, works loose, with the result that the commutator shifts its position and the firing becomes irregular. To set the outer box in its correct position with relation to the "wiper" or rotating contact, the piston must be placed so that the back end is about $\frac{1}{8}$-in. forward on its working stroke, *i.e.*, measuring from the combustion chamber the piston is about $\frac{1}{8}$-in. away from the end of the liner. This may be measured from outside by removing the sparking plug

and inserting a piece of wire long enough to follow the piston on its outward stroke, the positions can then be marked by means



VIEW SHEWING RELATIVE POSITIONS OF IGNITION LEVER AND COMMUTATOR.

of file cuts on the wire, and the commutator set accordingly. The lever on the steering pillar, worked by the driver, should

then be at its topmost position, giving late ignition to the charge in the cylinder. The point of earliest ignition is governed by the travel of this lever, which regulates the firing point in the cylinder according to the speed at which the motor is running. It is in the proper manipulation of the ignition that the most effective work may be obtained from the motor, and smoothness in the running of the car. The wiper must press slightly on the fibre ring of the commutator, and should make contact on the metal portion, so that as soon as it touches it "buzzes" the coil. When setting the commutator for a multi-cylinder motor it must be carefully noted that the coil which "buzzes" is the correct one for the cylinder that is being tested, and also that the coils "fire" the cylinders in the same sequence as the exhaust valves operate, if they do not work in this way, the wiring must be altered, and may

be done on either the high or low tension circuits, but not both.

No. 3. Short Circuits and Loose Wires. — The current may be leaking owing to defective insulation of one of the wires, water getting on the sparking plug, connections to the commutator needing attention, or some metallic object fouling the battery terminals. Starting with the battery or sparking plug these should be examined in turn, and in case of defective insulation a new wire should be substituted. The first thing to do, however, in the case of ignition failure, is always to see if any of the connections or wires are loose.

No. 4. The Coil. —This seldom is the cause of trouble, the only part which may need occasional adjustment being the trembler, the quicker this moves the better the spark; a very good way of "setting" it is to start the motor and carefully adjust the trembler, while running, until the most effective position is found. It may

happen on rare occasions that the platinum point of the regulating screw may become fused with the other platinum point on the trembler, they must then be carefully separated, and the surfaces smoothed with a very fine file; this occurrence usually indicates that the condenser of the coil is not working properly. When attaching wires to the coil care must be taken not to use too much force, otherwise the terminals may be twisted round and break the connections inside.

SUMMARY.

1.—Keep cells fully charged.

2.—Keep all tools and metal articles away from the accumulators.

3.—See that all connections are secure.

4.—Keep trembler on coil in proper adjustment.

5.—See that the sparking plug points are right distance apart, and that the porcelain is not cracked or dirty.

6.—See that the fibre ring in the contact breaker box has not swollen through damp, and that the "wiper" can revolve freely.

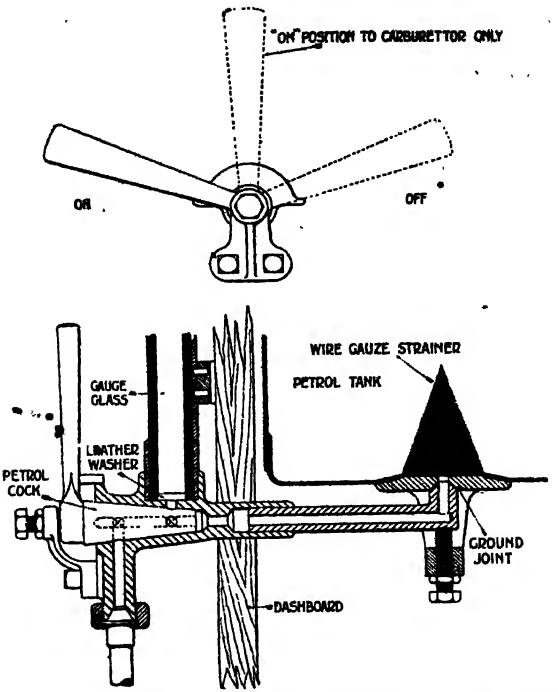
7.—The commutator box must be kept clean and contacts securely made.

Petrol Supply.

It is of the greatest importance to remember that petrol is a highly inflammable liquid, and therefore smoking should be prohibited wherever it may be stored, and in the vicinity of the car whilst the replenishment of the tank is taking place; it is advisable at night time to remove the side lamps from the car during this operation. Fill up with petrol when the car is outside the motor house.

The petrol tank is situated immediately in front of the dashboard, the filling hole being easy of access at the top of the tank. The supply pipe to the carburettor is connected to the bottom of the tank and leads to a three-way cock fitted on the dashboard, a gauge glass is also placed on the dashboard, and connected to the supply pipe, which registers the amount of petrol in the tank; in the event of this glass getting

broken the petrol cock should be turned off. This is arranged so that the gauge glass



SECTIONAL VIEW OF PETROL TANK AND 3-WAY COCK CONTROLLING SUPPLY OF PETROL TO CARBURETTOR.

may be placed out of operation without interfering with the supply of petrol to the

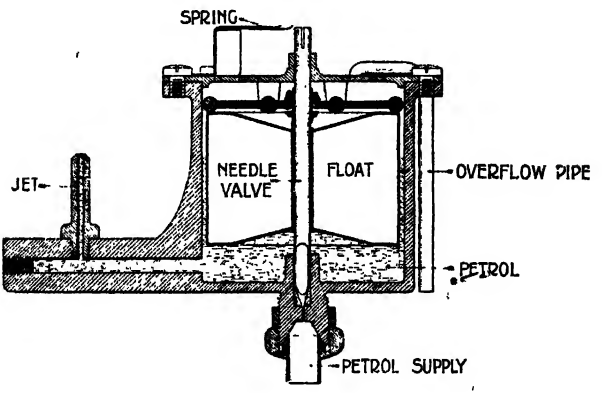
motor, and replacement of the glass may be left till a convenient time occurs for it to be attended to. When filling the tank with petrol use the tundish fitted with strainer, which is included in the kit supplied with the car, so that the spirit shall be properly strained and the tank kept free from dirt and other foreign matter; care must also be taken that no water gets put in the tank, as this would cause considerable trouble in the running of the motor. Water is occasionally present in the petrol itself, should this be suspected the last half-pint or so of the liquid in the can should not be emptied into the tank, as the water, being heavier than petrol, will remain at the bottom of the can. Any leaks which may develop at the various connections should be immediately attended to. In the sectional illustration of the tank and fittings it will be seen that the outlet pipe from the tank is secured in position by means of a set screw which forces the pipe up to a ground joint, the petrol cock is

made taper and is also secured by a set screw; should this tap work too stiffly, the screw may be slacked off a little, but not far enough to cause a leakage of petrol. When a leak occurs at either of these joints the tank must be emptied, the joints carefully examined, and if necessary, "ground in," this is done with a little fine emery powder mixed with oil. The various parts must be carefully cleaned after the operation before being replaced in position.

Carburettor.

The petrol is conveyed through a copper pipe to the bottom of the float chamber, in which is fitted a needle valve that automatically regulates the supply to the carburettor. As will be seen from the illustration, the stem of this valve passes through the top of the chamber, and by this means it may be easily ascertained whether the petrol supply is being properly maintained. If it is possible to rattle the

valve and push it easily up and down it indicates that the float chamber is empty, and the various connections must then be examined to see where the stoppage occurs. Turn the petrol off at the cock on



SECTIONAL VIEW OF FLOAT CHAMBER

dashboard before undoing any joints. Flooding of the carburettor may occur, which shows at once that the needle valve is not acting; this may be caused by a piece of grit which has worked its way on to the valve seating, and may often be

remedied by simply grinding the valve on to its seat without the necessity of taking any of the mechanism apart. Or it may be that the float is punctured, with the result that the valve is held open and causes the carburettor to flood. In this case the float must be removed and the top side marked so that it may be replaced correctly, then carefully examine it to find the hole (which may be very small), then make another hole by which means the petrol can be blown out; when the float is quite empty the holes should be carefully soldered up again and a test made by dipping it in a pail of water to see that the repair is effective. Another method of emptying the float is to apply heat to the outside, which, by causing rapid expansion of the petrol will force it out by the same hole as that by which it had entered.

The function of the float is to keep the petrol at a constant level with the top of the jet, this jet (which is in a separate chamber)

is pierced with a small hole from which the petrol is "sprayed" by the suction of the piston on the outward stroke of the motor, it is screwed down to its seating (a special box spanner being provided for doing this), and must always be tightly screwed home, or a leakage of petrol will occur. In the event of the jet becoming stopped up, it must be removed and carefully cleaned with a fine wire or needle, which should be small enough to easily pass through the hole, this must be carefully guarded from any risk of becoming enlarged through using too big an instrument for the purpose, as the size of this hole is determined at the time the motor is tested in the shop, and any alteration which may be subsequently made will probably result in a sacrifice of the efficiency of the motor.

Air Bottle.

This is made of aluminium and open to the atmosphere at one end; the proper

position for the shutter which controls this opening is, to be wide open under normal running conditions. It should only be closed during cleaning operations to prevent water or dirt getting into the carburettor. Some users prefer to have an additional air inlet fitted with separate control from the driver's seat, and for those who do not mind the extra trouble involved in its use, there is no doubt that this will improve the running of the motor at high speed, and will tend to economy of petrol consumption. We have lately introduced a small valve for use on standard pattern cars, by which the same result is obtained automatically. The cost of this valve is not great, and it can be very easily fitted to existing cars. The use of this additional valve does not increase the power of the engine or affect its running, other than to reduce the fuel consumption at high speed.

Throttle Valve.

On WOLSELEY CARS the throttle merely governs the quantity of vapour supplied to the motor, and does not affect the proportions of petrol and air; this valve is operated by a lever working on a quadrant fitted to the steering pillar and under the control of the driver. The valve is made in the form of a barrel which works in a fitting attached to the vapour supply pipe from the carburettor to the combustion chamber. The mechanism of this is perfectly simple, and self-explanatory, the only points requiring attention being the various nuts connected to the actuating rods which will require occasional examination to see that they have not worked loose.

Auxiliary Throttle.

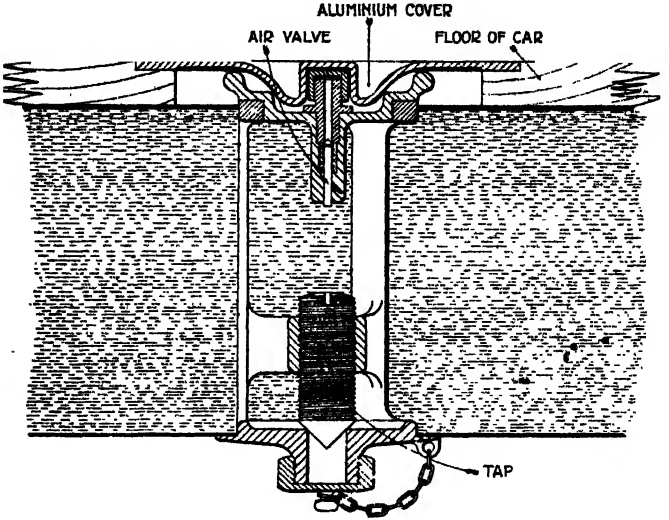
Additional control is obtained by fitting a pedal so that the throttle may be controlled by foot, thus leaving the hands

free to attend to the steering and brakes. This means of control is also very good for long runs, as by slightly resting the foot on this pedal a steady pace may be maintained on the level with an instant increase of power when hills are encountered. A few drops of oil should occasionally be put on the spiral spring to keep it in good condition and free from rust.

Spare Petrol Tanks.

These are usually fixed under the back portion of the body, and are fitted with a special form of cover, which is reached by lifting a portion of the flooring in the back part of the body. The connection between this tank and the main supply tank is by means of a copper pipe, and the petrol transferred from one to the other by air pressure. The air valve (fitted in the tank cover), is made so that an ordinary tyre pump may be used for pumping air into the tank. The pressure needed should never rise above

5-lbs. to the square inch. Should the petrol not flow freely under this pressure the connections should be examined to see where the stoppage occurs. The tap



SECTIONAL VIEW OF SPARE PETROL TANK SHEWING ARRANGEMENT OF TAP AND AIR VALVE.

controlling the supply from this tank to the other is operated by a screwdriver, and should be kept closed when the tank is not in use.

SUMMARY.

1.—Always close tap on gauge glass when car is not in use.

2.—See that float valve is working properly.

3.—Use tundish with strainer fitted when filling tanks.

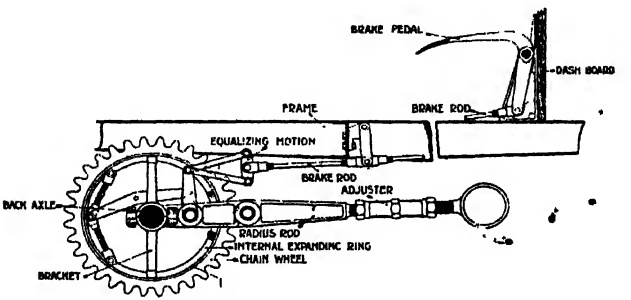
4.—Always run with air inlet full open, and only close it during cleaning operations.

5.—Be careful not to use too much air pressure when forcing petrol from spare tank.

6.—Never smoke or have a naked light near when examining or filling petrol tanks.

Brakes.

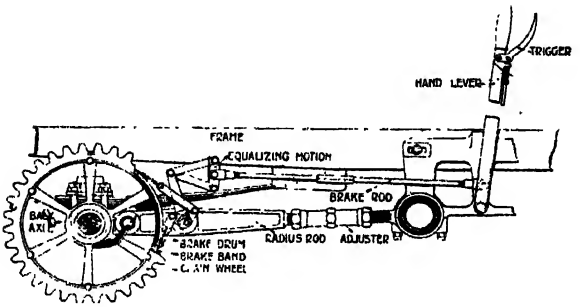
These should be examined both before and after a "run," as the passengers' safety, as well as that of other users of the road, is dependent upon their efficiency. All nuts should be quite secure, and any "back-lash" in the pull-rods and levers must be taken



ARRANGEMENT OF FOOT BRAKE

up. The main brake is that operated by the left pedal and is of the internal expanding type. In combination with the chain wheel casting fitted to the back road wheels is a drum, inside which is fitted a cast-iron ring, supported by a bracket clipped to the back axle. To this

internal brake adjustable toggle levers are fitted, operated by a bell crank from the brake rod which extends across the car and takes its bearings in the radius rods. This rod receives its motion from the brake pedal, and is fitted with links to equalise the braking effort put on each road wheel;



ARRANGEMENT OF HAND BRAKE

normally the ring is supported by the bracket arms, and the road wheels are free to revolve, but on depressing the brake pedal the toggle levers expand the ring and it becomes a powerful brake.

Another brake, operated by hand-lever from the driver's seat, works on the outer

periphery of the same brake drum, and consists of a metal band which compresses and grips the drum, the motion on this is also equalised to both road wheels. Both types of brakes are designed so as to be equally effective in either direction the car may be travelling. The clutch is independent in its action and not in connection with either of the brakes, thus making it impossible to leave the car with one of the speeds in mesh, and the engine running. Whenever the brake pedal is found to depress so far as to touch the foot board, it should be adjusted by the pull-rod, which is made with hexagon sides in the centre so that a spanner may be used for this purpose. When adjusting up, the amount of movement allowed on the internal rings must be equal for both brakes. Should the brakes squeak, a small quantity of oil should be applied, but too much of this will render them inoperative.

SUMMARY.

1.—Always examine brakes before taking car out.

2.—See that brake pedal is adjusted to right height from foot-board.

3.—When adjusting the amount of movement on back brakes make this equal for each brake.

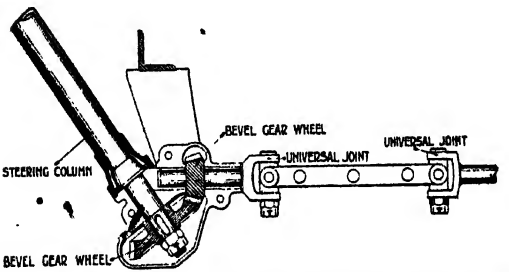
4.—Thoroughly clean brakes with paraffin occasionally to remove grease and dirt.

5.—The brake drums should be washed out with petrol occasionally, and a little grease applied to the joints of motion rods.

Steering.

It is unnecessary for us to point out how very important it is that the steering mechanism shall be absolutely reliable, special attention has therefore been devoted to this point and the steering gear designed so as to be irreversible, which means that the road wheels are automatically locked into whatever position the driver may guide them. The arrangement of the various parts is as follows:—At the lower end of the steering pillar, which is operated in the usual manner by a hand wheel, is mounted a bevel gear contained in an aluminium box suspended from one of the cross members of the frame. By means of this gear the motion is transmitted to a worm wheel gear carried on the front axle and connected directly to the steering wheels by means of rods. Both the bevel gears and worm gear will require greasing

about every six months with heavy lubricant, such as is used for the clutch and axle bearings. The swivel bearings which carry the front wheel axles will require examination and greasing if necessary each time the car is used. After a considerable amount



SECTIONAL VIEW OF STEERING GEAR BOX, SHOWING BEVEL GEAR WHEELS.

of wear it may be necessary to adjust the setting of the worm gearing, this is done by removing the worm wheel and filing some of the metal off the casing so as to bring the wheels deeper into gear, this is a job which should be done by a skilled

mechanic, or if preferred the box containing the worm gear may be removed from the front axle and sent to the works for the adjustment to be made. The steering may become stiff owing to dirt working its way into the joints of connecting rods, and in this case the front axle should be jacked up and all joints thoroughly well washed out with paraffin and then lubricated afresh, should this not remedy the evil a careful examination must be made to ascertain the cause of the trouble. When the car is stationary the wheels should never be forced round by the steering wheel unless assistance is rendered by someone pulling the road wheels in the direction required.

SUMMARY.

1.—Grease swivel axles before every run; bevel and worm gears require greasing once a month.

2.—Never turn the road wheels by means of steering wheel when the car is stationary.

3.—When sending car by rail disconnect the connection between the bevel and worm gears.

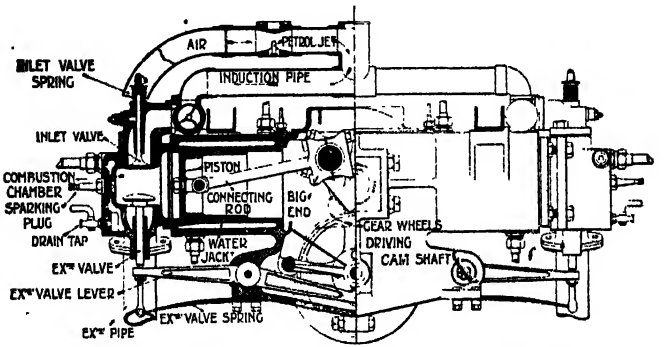
The Motor.

The first point to be considered in the care of a motor is its efficient lubrication; this has already been mentioned under the heading of "Lubrication," but we will here deal with the various bearings in the motor itself. The most important bearing is the "big end" of the connecting rod, where it is attached to the crankshaft; this is fed with oil through a pipe attached to one of the side bearings for a single cylinder motor, and through the middle crank shaft bearing for a multi-cylinder motor. On one of the webs of the crank shaft is fixed a grooved ring, and the oil passing through the bearing is conveyed to this ring, and taken to the "big end" by centrifugal force, being fed to the "brasses" through holes drilled in the crank pin.

The gudgeon pin is, in the WOLSELEY type of connecting rod, made in one piece

with it and turned to fit two eye bolts, which are secured through the ends of the piston by nuts; there is thus no liability of the cylinder liner getting scored through the gudgeon pin working loose. The two bearings are lubricated in conjunction with the piston itself, oil being conveyed to them by copper pipes leading direct to the eye-bolts from grooves cut in the piston. Wear or slackness in any of these bearings will be indicated by a "knocking" sound when the motor is running, this warning should never be neglected, but a careful examination made at once to see whether the nuts may have worked loose, or whether a bearing has become scored through want of lubrication. All crankshaft bearings are fitted with brass bushes which, so long as they are well lubricated will require little attention, and should only be taken apart for examination when the car receives a general overhaul. This should be done every nine to twelve months, according to

the amount of running the car has had. Below the crank shaft is fitted another shaft driven by spur gear wheels at half speed, which operate rocking levers acting on the lower portion of the valve spindle. A laminated steel spring is used to return the



HALF SECTIONAL ELEVATION OF 4 CYLINDER MOTOR.

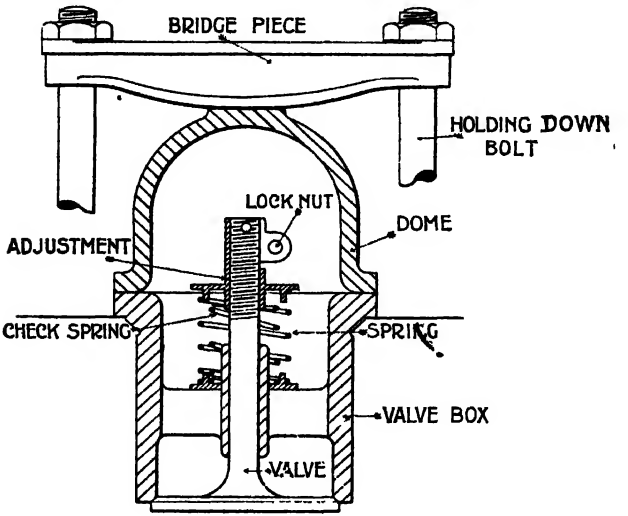
valve to its seating. Sliding cams are also fitted on this shaft, operated by a pull-out hand lever from the side of the car; these are used for the purpose of relieving compression when starting the motor. When not in use they are withdrawn by means of a strong spring.

On an extension of the shaft a spiral gear is placed which drives another shaft at right angles to it for working the circulating pump to maintain the cooling of the motor, and on the extreme end of the half speed shaft is mounted the commutator or automatic switch mentioned in the chapter on "Ignition," which controls the ignition period in the motor cylinder, this is encased in an aluminium box to protect it from the weather, and as previously mentioned is connected directly to the ignition lever on the steering pillar which is under the control of the driver.

Valves.

These are situated in the combustion chamber and are placed vertically one above the other, the inlet valve being uppermost. This valve is held on to its seating by a coil spring, the tension on which can be adjusted by a clip screwed on to the valve

stem. When it is necessary to set this spring, the proper amount of tension to allow is such that 1½-lbs. weight should just lift the valve from its seat. On the

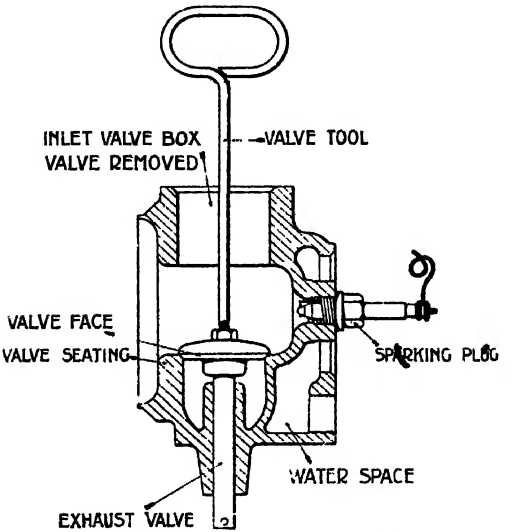


INLET VALVE (ENCLOSED TYPE)

clip is a lock-nut which should be examined periodically and tightened up if required. An enclosed type of inlet valve is fitted to the 6-h.p. and 12-h.p. cars, which permits of

the valve together with its box being easily removed for inspection. The exhaust valve fitted on the under side of the combustion chamber is "built up" and consists of a mild steel spindle to which a cast iron head is screwed and locked by a patent method. This valve will require considerably more attention in the matter of grinding than the inlet valve, as it is subjected to very great heat and any particles of burnt oil in the exhaust gases are liable to pit the face of the seating. The method of "grinding in" this valve is to remove the inlet valve and box, the exhaust spring must then be unshipped and the valve removed through the inlet valve hole. A special tool is provided, as will be seen in the diagram, which should be screwed into the head of the valve; a paste, composed of flour, emery, and oil, is then put on the face, and the valve lowered into position again, with a light pressure it is then ground on to its seat by twisting first one way and then the other,

the valve being occasionally lifted and moved round about a quarter turn and the operation repeated, so as to ensure



METHOD OF GRINDING IN EXHAUST VALVE

the valve and seat facings being equally true all over. After a minute or so take out the valve and clean it, and see if the surface is quite bright and smooth all

over, if this is not so, the grinding must be continued till all "the pits" are ground out, and there are no discoloured places on the valve face. It is advisable to true this valve up in this way after every 500 miles, rather than to leave it until it gets very bad. The stem of the valve should also be examined to see if it is working quite freely in the guide hole. To ensure the best results from the motor it is perhaps advisable to replace this valve with a new one every six months. When the grinding operation is over, the emery and oil must be removed from the various parts by well washing out with petrol. The inlet valve will need very much less grinding in, the operations being the same with the exception that, as the valve stem projects through the casing sufficiently, it may be used to turn the valve by instead of using a special tool. When replacing the inlet valve the spring must be carefully adjusted to its former position. When

replacing the box in position it must be carefully screwed down, each nut on the holding down bolts being screwed a little at a time; the same remarks apply when replacing the combustion chamber after it has been removed. It should be remembered that the flanges through which the bolts pass are made of cast iron, and will not stand excessive pressure. The water joints at the breech end of the motor are made conical, and ground in so that no packing is required. In the event of the motor having been dismantled for examination or repair, the lift of the exhaust valve will need careful adjustment.

"Setting" Exhaust Valve.

To adjust the moment of closing a set screw is placed at the valve end of the rocking lever, and works directly on the valve stem, which permits the clearance between the lever and valve to be adjusted; this clearance should be about 1/32nd of an

inch. The valve must be set to open when the piston has travelled about 5/6th of its working stroke, and closed at about 1/80th of the suction stroke, the period during which it remains open is, therefore, 1 + 1/6th + 1/80th strokes. To set the valve

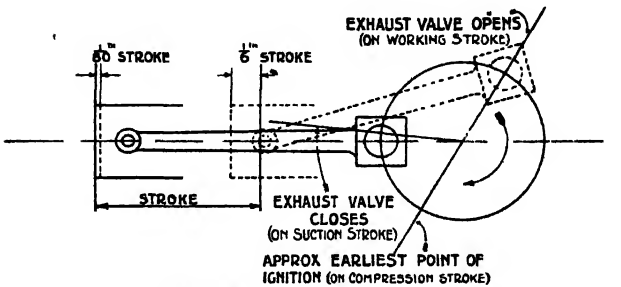


DIAGRAM SHOWING TIME OF EXHAUST VALVE OPENING.

the piston must be placed 1/80th stroke (about 1/16th of an inch) from its back dead centre or combustion chamber end, and the cam shaft then set in such a position that the valve can just close, the gear wheels, which actuate the cam shaft, are then "meshed" accordingly.

Clutch.

On one side the motor crank shaft is extended to carry the clutch which transmits the power by means of a Renold's chain to the gear box. A flange is turned on the crank shaft itself to which is bolted the fly wheel, this being recessed on one side to form the female portion of the clutch. The male portion of the clutch is mounted in combination with the Renold's chain wheel on a sliding bush and faced with leather, and is normally held in driving position by a volute spring, the compression on which is adjusted by a nut and lock-nut fitted at the extreme end of the crank shaft, the thrust of the spring being taken up by a ball bearing. It is important that this adjustment should be carefully looked after, as it is by this means that quietness in running and ease of control are secured. If the clutch slips the motor will fail to do its work on a hill, neither will it travel at a good speed on the level, and the

leather will very soon get worn out. On the other hand if there is too much pressure on the spring the clutch will become fierce and cause the car to jump when it is engaged, in addition to which it is difficult to change speed, requires extra effort to release the clutch and tends to wear out the gears. A forked lever operated by the clutch pedal controls the clutch action. At the outer end the crank shaft is bored to receive a "Stauffer" lubricator, by means of which heavy lubricant is fed through holes to the clutch bearing on the shaft. In the ordinary course of wear the leather face of the clutch will last two or three years before requiring attention, but should it become dry and hard a little castor oil may be applied. The Renold's gear wheel is made from mild steel, hardened, and is securely fastened to the iron centre. On the outer end of this centre is a sleeve made in halves and bolted together, and connected

through a bell crank to the foot pedal by which the clutch is controlled.

Commutator.

- The ignition control is also worked from the half speed motion shaft which actuates a commutator, the functions of which have already been described under the heading of "Ignition." Grease lubrication is used for this.

SUMMARY.

1.—When grinding in valves, use only very fine emery powder and oil.

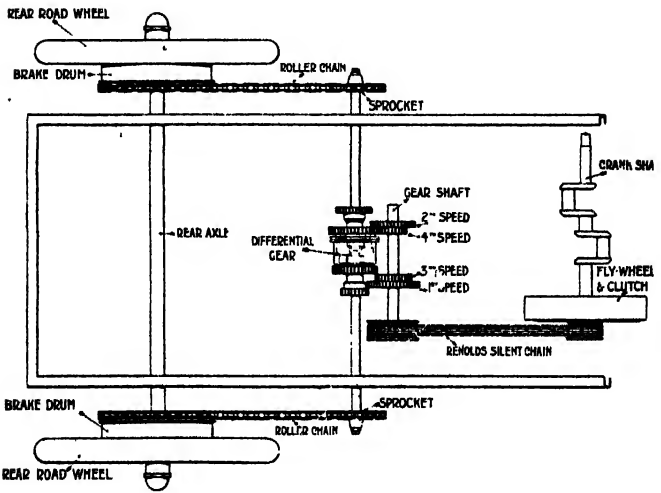
2.—After grinding in, valves and seats should be washed quite free from oil and grit with petrol before being replaced.

3.—Occasionally examine oil pipes in crank chamber to see that none of them are displaced.

4.—Drain dirty oil from crank chamber daily.

Transmission.

The power from the motor is transmitted in a very direct and simple manner, by means of a flexible silent-running chain, which is driven from the clutch and conveys



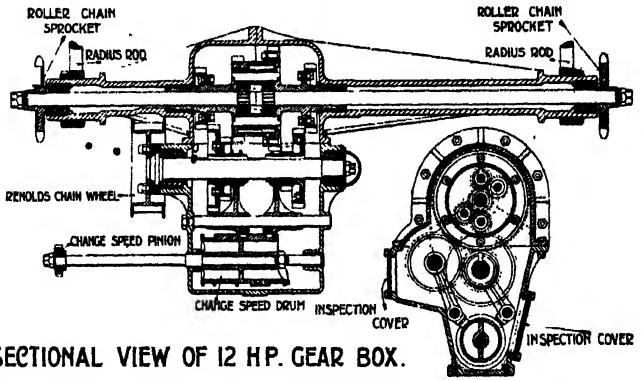
ARRANGEMENT OF WOLSELEY TRANSMISSION.

the drive to the first motion shaft in the gear box and thence by means of spur gears to sprockets mounted on the ends of the balance gear shafts, these in turn convey

the motion through roller chains to the road wheels; by this arrangement of the mechanism a directly parallel drive is obtained at all times independently of which speed may be in use.

Gear Box.

For the purposes of illustration we will describe in detail a 12-h.p. standard



SECTIONAL VIEW OF 12 H.P. GEAR BOX.

END VIEW OF GEAR BOX

gear box. All the shafts and gears are turned from mild steel forgings, hardened and ground true. The differential gears are of the spur tooth type, and a large margin

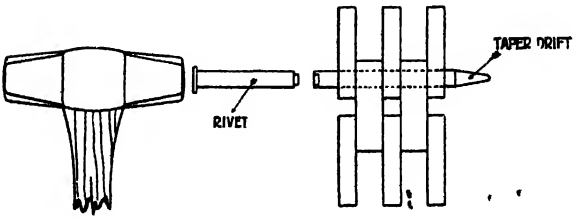
of safety has been allowed in their design to avoid all risk of breakage, as this is an inconvenient part of the mechanism to get at in the event of failure. On the first motion shaft which receives the drive from the motor, the gear wheels are mounted on sleeves, which slide on the shaft and engage the various gears with each other, these are actuated by a cam drum which in turn is operated from the driver's seat by the speed change lever, and permits not only for all changes being controlled by one movement, but also entirely prevents any possibility of more than one gear being brought into operation at a time. The gears on the "second motion" shaft are fitted on the differential gear box to which they are secured by bolts. By making the gears separate it is an inexpensive matter to replace one that may become worn. Both gear shafts run in ball bearings of the WOLSELEY patent design. The change speed lever is provided with an automatic

self-locking device which enables the driver to positively change speed in either direction without fear of over-running the proper position. The whole of the gearing is enclosed in an aluminium box, cast in three sections and bolted together. Inspection covers are provided, which also serve for filling the gear box with grease. The gears are lubricated by placing a quantity of heavy oil in the box, so that the gear wheels dip in it as they revolve and thus lubricate themselves. This oil requires replenishing from time to time, as the gears are likely to be noisy if they do not receive sufficient lubrication.

Chains.

The chains will after a certain amount of wear be found to have stretched and require shortening, and if a slight adjustment only is necessary, the gear box may be loosened by slacking off the nuts at the sides of frame, and at the point in front of

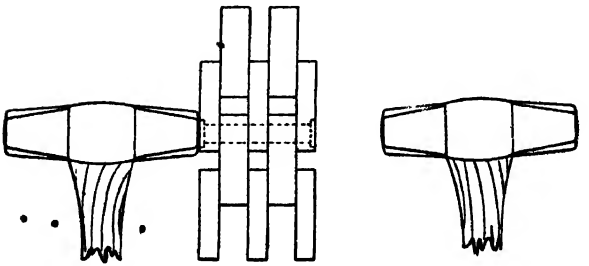
it where it is stayed to the cross member of the frame, and also loosening the radius rods, the gear box can then be moved back to the required position, care being taken that it is moved an equal distance on each



METHOD OF JOINING RENOLDS CHAIN.

side of the car. For this purpose an indicator has been fixed to the frame at either side, so that the amount of movement may be checked. If after making this adjustment there should still be too much play in the chain it will be necessary to remove one

of the links. In the Renold's pattern this is done by filing the top off one of the rivets, which can then be knocked out by a taper drift (supplied with the outfit). To join up this chain the same drift should



METHOD OF JOINING RENOLDS CHAIN.

be used, the taper end being inserted first, and the rivet then placed so that it follows on and pushes the drift right through the joint and itself takes up its proper position in the chain (see illustration); it is then locked by a small cap being placed in

position, and the end rivetted over by a few light blows from a hammer. When doing this use two hammers, one being held against the further side of the chain so as to prevent the links being bent by the force of the blows from the other hammer. The chain must be held in the same manner when removing a link. The roller chains will also need adjustment occasionally and in the event of having to remove a link it will be found on examination that the chain is joined by a small bolt and lock nut, which can easily be removed by a spanner; the chain is then taken apart, when a link can easily be removed or inserted, as the case may be. All the chains will require regular attention with regard to cleaning and lubricating.

Springs.

The radius rods between the back axle and the gear box must always be equally adjusted, and the shackles of the body

springs kept in their correct positions. This is indicated very clearly in the two sketches. *Fig. 1* shows a spring in its normal and

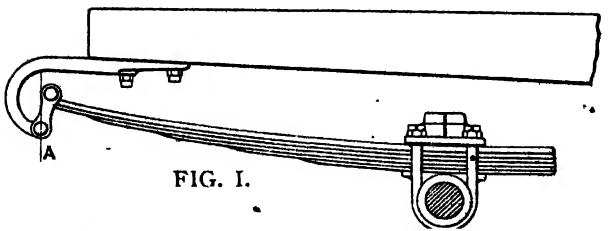


FIG. I.

NORMAL POSITION OF CARRIAGE SPRING
(WITH SHACKLE THE RIGHT SIDE OF LINE A)

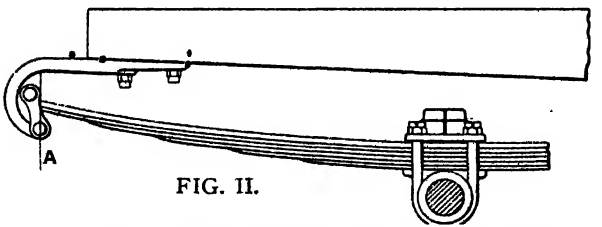


FIG. II.

WRONG POSITION OF CARRIAGE SPRING
(THE SHACKLE IS UNABLE TO WORK IN THIS POSITION AND THE SPRING IS LIABLE TO BREAK IF THE CAR IS RUN OVER ROUGH ROADS.)

correct position, and it will be seen that the end of the spring is in front of the centre line of the connecting bolt to the

spring hanger. *Fig. 2* indicates the wrong position; a heavy bump over a rough road on a spring when like this may cause it to break. When a car is sent by rail it is advisable to disconnect the connection between the steering pillar and the front axle, as it sometimes occurs in the event of an extra heavy bump during railway shunting operations that the car is jumped so violently as to force the shackle of the front spring out of position; and if the steering was connected up, this blow would probably cause serious injury to it. To replace this shackle the weight of the car must be taken off the front axle and the shackle carefully "prized" over till it resumes its former position.

The carriage springs will need greasing occasionally; use the same lubricant as for the other grease lubricators, and work it in between the leaves of the springs by means of a knife blade.

SUMMARY.

1.—When moving gear box to adjust side chains see that it is moved equally on either side, according to the gauge fitted on frame.

2.—When adjusting radius rods take special care that the carriage springs are in correct position.

3.—Replenish gear box with heavy oil about every six months.

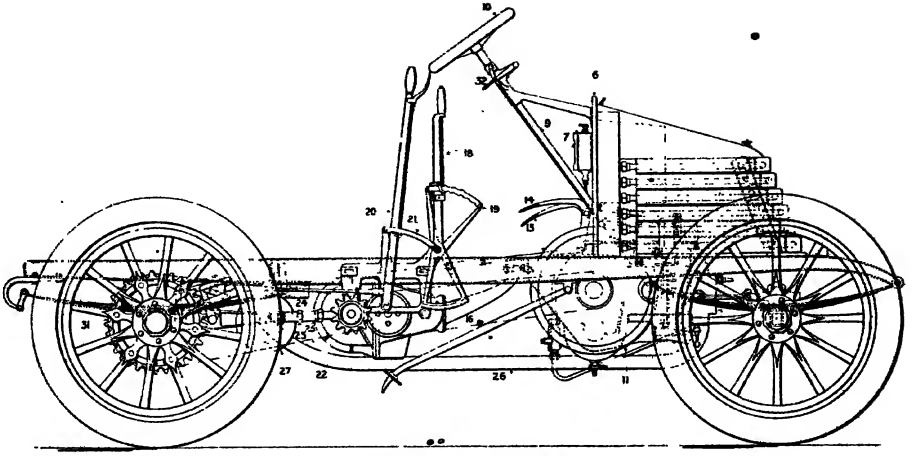
4.—Examine chains for wear. These should be removed from the car once a month and thoroughly cleaned. This may be best done by washing in paraffin, and afterwards dipping them in a bath of melted tallow and blacklead.

Driving Instructions.

We do not propose to do more than indicate the main principles which should be known by every motor car driver, dealing more particularly with those points which are peculiar to the WOLSELEY CARS. After having mastered the principles of construction and functions of the various portions of the mechanism as described in the foregoing pages, driving may then be attempted. In the case of those who have never driven a car of any description before, it is almost essential that they should learn to drive under the personal supervision of an expert. In the first place, the car should be taken to a quiet and fairly level road with a good dry surface where there is no traffic, the novice should then be put in charge.

Starting Motor.

The sequence of operations will be as follows: Turn on the lubricators, turn on the petrol tap at gauge glass, take the spring off the needle valve and float chamber, the half-compression cam must then be put in action, by pulling it out and giving it a half turn to secure it in position, the switch is then closed, the throttle lever opened full while the ignition lever is retarded to its latest point, then start the motor by inserting the starting handle through the bracket provided for it, and with two or three turns the motor will start. The starting handle is then removed, and the half-compression released. The driver now mounts to his seat and releases the side brakes, then depresses the clutch pedal with his right foot to place the clutch out of gear with the motor, and pushes the change speed lever into the lowest gear (first speed), the ignition lever should be slightly advanced to increase the speed of the motor,

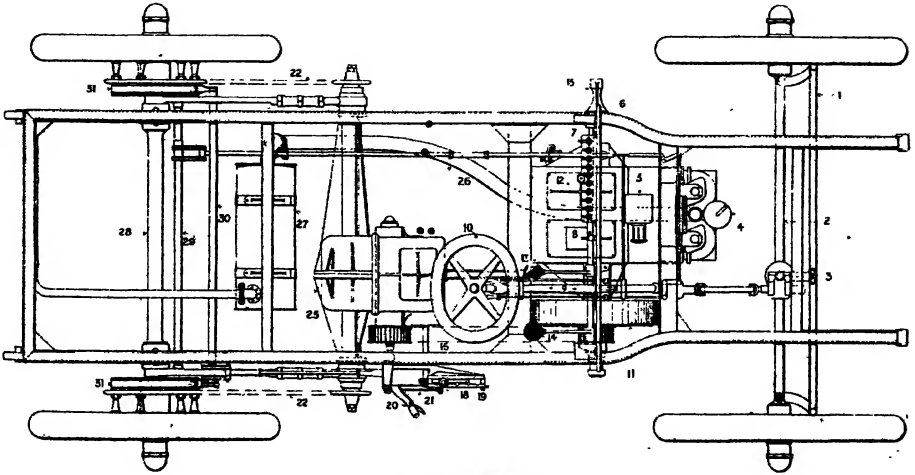


Side Elevation of Châssis.

KEY TO REFERENCE NUMBERS.

1—Steering Rod.
2—Front Axle.
3—Worm Steering Gear.
4—Float Chamber.
5—Air Bottle.
6—Dashboard.
7—Oil Reservoir.
8—Petrol Gauge.
9—Steering Bracket.
10—Steering Wheel.
11—Fly Wheel.
12—Crank Chamber.
13—Brake Pedal.
14—Clutch Pedal.
15—Starting Handle Bracket.
16—Renold's Chain.

(See opposite page for continuation of Key.)



Plan of Châssis.

KEY TO REFERENCE NUMBERS.

17—Lamp Brackets.
18—Gear Lever.
19—Gear Quadrant.
20—Brake Lever.
21—Brake Quadrant.
22—Roller Chain.
23—Radius Rod.
24—Spring Bracket.
25—Gear Box.
26—Exhaust Pipe.
27—Exhaust Box.
28—Back Axle.
29—Internal Brake Rod.
30—Band Brake Rod.
31—Rear Wheel Brake.
32—Throttle Lever.
33—Ignition Lever.

(See opposite page for commencement of Key.)

and the clutch pedal gradually released, it will then be found that the car will move slowly forward. Slow travelling must be maintained until the driver has thoroughly mastered the manipulation of the car, not only as regards starting and stopping, but steering backward as well as forward; he must also become proficient in gear changing, which is a point in which most novices fail at first.

Speed Changing.

The system of sliding one gear sideways into mesh with another is quite satisfactory when properly done, but requires a little knack, which only requires practice to make one proficient. Careless speed changing will result in the corners of the teeth being worn away, besides causing a great deal of unnecessary noise. Should a gear be found not to slip in easily it is worse than useless to keep trying to force it in, as

this will only result in grinding away the teeth. To show how important this point is, we may say that some drivers will wear out a set of gears in less than 1,000 miles running, whilst others can make their gears last them for 10,000 miles, and even more. In order that the action may be fully understood, we will describe as clearly as possible what actually happens when a speed is changed. Before a pair of gears running at different speeds can be brought into mesh with one another, it is obvious that the rate of speed must be equal on each, any variation between them will cause one gear to grind against the other. In *Fig. 1* two pairs of gear wheels are illustrated, and it is assumed that the gear on the top shaft is being driven by the motor at 500 revolutions per minute, and that the ratio between the upper and lower gears is two to one, the lower shaft must therefore be running at half the speed of

the upper, or 250 revolutions per minute. We will now suppose the top gear to be moved along the shaft for engaging the

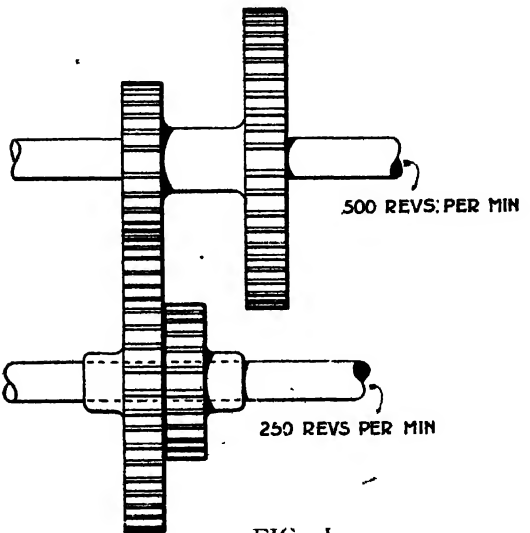


FIG. I.

other gear. It will be evident that this cannot be done until either the top shaft is decreased in speed to half that of the

lower, viz., 125 revolutions per minute, or the lower shaft increased in speed to 1,000 revolutions per minute, or twice that of the upper shaft.

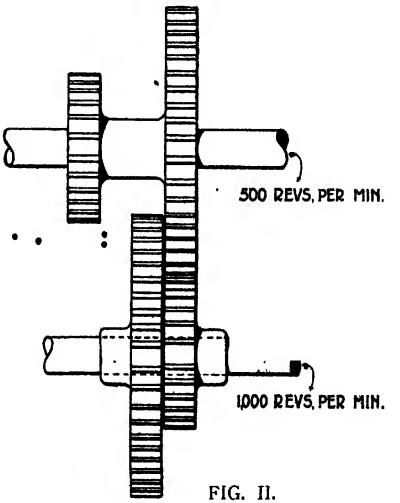


FIG. II.

To accomplish the result by the first means the speed of the motor will have

to be reduced considerably, and in the second case the car would have to be descending a hill to enable it to increase to the speed required by its own volition. It, of course, is not possible to wait until the car is travelling on a down grade to change speed to a higher gear, therefore it is necessary to obtain the desired result by another method. This is done by holding the clutch out of action by the pedal, so that the speed of the first motion shaft shall be reduced to the correct rate for the sliding gear to "mesh" with that on the balance gear shaft. It will then be found possible to push the gear lever forward and engage a higher speed. In reducing speed from a higher to a lower gear it will be also evident from the diagrams that it is impossible to effect the change while the motor is running at a high rate of speed, and the knowledge of the exact speed at which to change down can only be acquired by practice. The operations in

themselves are perfectly simple, and consist of first depressing the clutch pedal, then pull the gear lever to the free

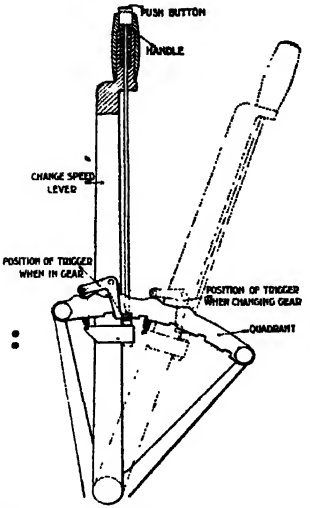


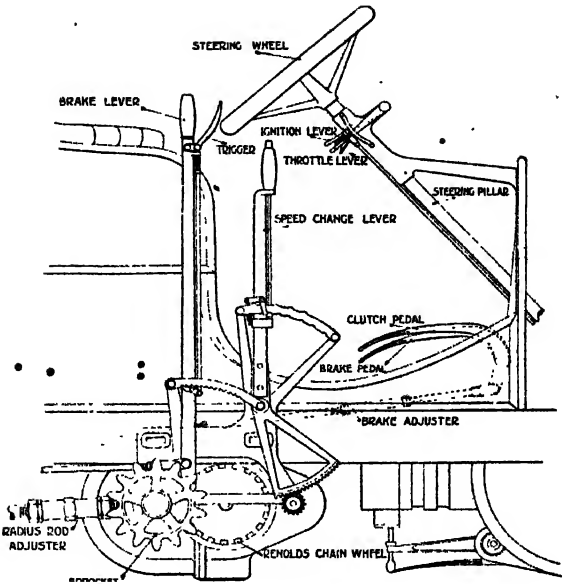
DIAGRAM ILLUSTRATING ACTION OF AUTOMATIC LOCK IN CONNECTION WITH SPEED CHANGE.

position between two gears; let the clutch in again for an instant, or "tip" it, then pull the lever into the other gear and

engage the clutch. The description of these operations may make it appear a difficult matter to change speed, but with a little practice and exercise of judgment it will be found to become quite a simple matter.

It is sometimes possible to rush a fairly steep gradient, and coax the car up it without changing speed by skilful use of the clutch, but this can only be acquired by much practice. The brakes should never be suddenly applied, unless in case of emergency, as this is not only very detrimental to the tyres, but is liable to inflict severe strain on the transmission gear generally. When in traffic, or passing other vehicles on the road, both feet should be kept lightly resting on the pedals, in case of need for sudden action. When descending long steep gradients, the hand brake should be used, but for ordinary purposes on the level and in traffic the foot brake will be found to be sufficiently powerful.

A driver cannot be considered expert until steering becomes as much an instinct



GENERAL ARRANGEMENT OF CONTROLLING GEAR

with him as walking, and he feels able to take any sudden occurrence that may

happen while travelling as a matter of course, and naturally make the necessary movements to avert disaster, and it is only when the operator can manipulate without conscious effort of will the throttle, clutch, brakes, etc., that a car can be said to be safely in his charge. When travelling through unknown country greater vigilance will be required when approaching corners or cross-roads, and especially when ascending or descending hills. On approaching a steep descent it is advisable to reduce the speed by changing into the third or second gear, as this enables the motor to exercise a very powerful retarding influence in addition to the other brakes.

A tyre insufficiently inflated is a source of danger when travelling fast, as it may roll off the rim, or burst if severe strain is put on it when in a deflated condition, with the consequent danger of the wheel collapsing.

Side-Slip.

Skidding on a wet and greasy road will also need expert handling of the car to prevent mishap. A plan adopted by many motorists who are not quite sure of their skill in dealing with an emergency of this kind, is to take their car out on a wet day to a deserted road and experiment in skidding and how to prevent it; or alternatively how to make the car skid in the direction in which it is wanted to go. The main points to be considered in this connection are: Firstly—travel at a very slow rate of speed over greasy portions of the road, and in traffic. In case a bad slip occurs it must be corrected mainly by the steering and manipulation of the clutch. To apply the brakes hard will, in the generality of cases, only make the matter worse. If the forward movement of the car needs slowing, the brakes should be applied and released again if they make the car

"slew" too much, but there can be no hard and fast rules laid down for dealing with this evil, as the conditions vary in every case. The chief point to be remembered is that slow speed, especially when going round corners, is necessary when the roads are slippery.

SUMMARY.

1.—Do not continue running a car when it is not working properly. Stop at a convenient place and examine the mechanism and electrical equipment to discover where the trouble may be.

2.—See that brake levers and rings are adjusted correctly, and are periodically cleaned from dust and mud.

3.—When undertaking a long journey carry spare valves and springs for replacements if necessary.

4.—See that the tool kit supplied with the car is complete. This should always be carried in one of the cupboards provided.

Troubles by the Wayside.

The following list of wayside troubles has been compiled from various sources, the majority of cases being actual experiences of WOLSELEY owners. We would like to point out, however, that with the exception of tyre troubles, most stoppages on the road may be traced to careless inspection of the car when overhauling in the motor house. We have collated this list for easy reference under various headings.

The cause of a car running badly can, as a rule, be safely assumed to be due to either faulty ignition or the petrol supply being out of order. When mechanical troubles occur they usually make themselves sufficiently evident to cause the driver to stop at once.

It is never wise to continue running

a car if it is not doing its best, as it is not only uncomfortable to ride in, but also much more expensive in up-keep, so that careful and regular attention with occasional thorough overhauling well repays the owner for the trouble and time expended.

Ignition.

Missing fire may occur from *(a)* Battery Running Down; *(b)* Loose Wires; *(c)* Dirty Contacts; *(d)* Short Circuiting, through Bad Insulation; *(e)* Dirty Plug; *(f)* Bad Connection to the Commutator; or *(g)* Coil may need adjustment. These points should be taken in the order named and a careful examination made. Missing should never be permitted to continue, as it places undue strain on the crank shaft and may eventually cause a breakage of this part. When examining the sparking plug the switch should always be turned off to avoid the liability of receiving a nasty shock.

Petrol.

Trouble with the carburettor may be due to Bad Petrol; this should never be of higher specific gravity than ·700. If it should be impossible to obtain the best spirit, the poorer may be made to serve by slightly closing the air inlet on the air bottle, and increasing the lift of the inlet valve so that a sufficiently rich mixture can be supplied to the motor. These adjustments must, of course, be altered to their former positions when a better quality of spirit is again used. Water is occasionally present in the petrol and will cause the motor to work "jerkily," and perhaps stop. If this is suspected to be the cause of the trouble, the feed pipe from the tank to the carburettor must be disconnected and the water run to waste. The jet in the carburettor may become stopped up with foreign matter, and will need removing and cleaning out. The carburettor may become flooded either through the needle valve needing grinding

in, or the float being punctured; the method of dealing with these has already been described in the chapter on petrol supply under the heading of "Carburettor."

Inlet Valve.

The adjusting nut on the valve stem sometimes works loose, with the result that the valve gets too much lift and does not return properly to its seating; it may also get gummy from the burnt gases in the cylinder, and should be cleaned by squirting paraffin or petrol on to it. The exhaust valve spring, although purposely made very strong to ensure long wear, sometimes breaks, and a spare one should therefore always be carried in the tool kit.

Brakes.

If the brakes are not correctly adjusted they will cause unnecessary friction, and "slow" the car. This trouble can be at once detected by feeling the brake drum to see if it has got overheated.

The adjustment of the toggle levers which expand the brake ring, and are operated by the foot pedal, is a simple matter. Sufficient clearance should be allowed for this ring to contract only just enough to permit the road wheels to revolve freely.

The brake drums should be washed out with petrol occasionally and a little heavy grease applied to the various joints of the motion rods. The foot brake should be quite sufficient for all ordinary purposes, and the hand brake used for emergencies only.

SUMMARY.

1.—Carry a spare accumulator and sparking plugs. These should be examined and tested before starting on a journey, to see that they are in good order.

2.—When in doubt as to the quality of petrol it should be tested with a densimeter. Never use petrol of higher specific gravity than ·700.

3.—Wash the inlet valves occasionally by squirting paraffin through them.

Items to be attended to when getting car ready for a run.

1.—Fill water, petrol, and oil vessels.

2.—Decide whether it will be advisable to carry spare petrol, lubricating oil and grease.

3.—Examine all lubricating pipes and see that they are securely fastened.

4.—If the car has pneumatic tyres, carry repair outfit and pump, together with whatever spare tubes, etc., may be considered necessary. See that the tyres are pumped hard.

5.—Turn up lubricator levers and see that the oil is dropping freely. Turn the grease lubricators on clutch shaft, steering joints, pump spindle, and contact breaker.

6.—Wipe the porcelain of the sparking plug, and see that the electrical connections are secure. Carry spare plugs.

7.—Examine the exhaust valve spring to see that it is not broken. Always carry spare springs on the car.

8.—See that the lamps are properly trimmed and cleaned, ready for lighting. Carry extra carbide for acetylene lamps.

9.—To start the motor, put the half compression cam into position. Put throttle to "full-on" position, and sparking lever to its least advanced position. See that spring is off the top of float valve. Push the petrol tap lever at bottom of gauge-glass over to the left side as far as it will go. Turn on switch. See that speed change lever is in "out of gear" position. Put starting handle into position, pressing it well in towards the shaft. One or two turns should then be sufficient to start the motor. It is quite useless to turn away at the handle if the motor won't start immediately. Better examine the various wires, plugs, etc., and find out the cause of the difficulty.

Items to be attended to when car has been for a run.

1.—Turn off switch.

2.—Close all lubricating and petrol taps.

3.—Feel all bearings, and make what adjustments are necessary.

4.—In frosty weather empty all water out of radiators and motor.

5.—Test accumulators; if run down, there may be time to recharge. It is annoying to find they require charging when about to start out for a run.

6.—Examine, and if necessary, repair the tyres and spare inner tubes.

7.—Clean all parts thoroughly (see instructions under heading of Cleaning).

List of Charges.

Expert's Time. .

We make a charge of 12/6 per day of ten hours for expert's time in teaching clients how to drive and manage their cars, or on out-repair jobs. The time is booked from the date the man actually leaves our works until his return, and to this is added his expenses, which include third-class railway fares and any charges he may have to pay for cabs, board and lodgings, telegrams, etc. If ten hours per day is exceeded a proportionately higher charge will be made, as for all overtime we pay our men increased rates.

Each man when he is sent out is provided with a time and expenses card, at the foot of which is a note asking clients not only to sign the card, but to initial each item. We are compelled to make our charges strictly upon the cards brought back by the men, although we question each item not initialled, with the exception of expenses for the return journey.

Prices of Spare Parts for Standard Car

(12-h.p.)

		£	s.	d.
Exhaust Valve	each	0	7	6
„ „ Spring, laminated pattern	„	0	8	0
„ „ „ coil pattern ...	„	0	0	9
Induction Valve	„	0	8	6
„ „ Springs... ...	„	0	0	5
Sparking Plugs, E.I.C. pattern ...	„	0	7	6
„ „ D.D. pattern ...	„	0	3	6
2-cell Accumulator	„	2	12	6
Pocket Voltmeter	„	1	5	0
Ignition Coil, according to number of cylinders	per cylinder	2	10	0
Petrol Tank (to hold four gallons) ...	...	4	0	0
Sprag	...	1	10	0
Sprockets, gun metal ...	... per tooth	0	1	6
„ malleable ...	... „	0	1	2
Roller Chain, "Coventry" ...	per foot	0	8	6
Cranked Link for ditto ...	... ...	0	3	6
Spare Links for "Renold's Silent" Chain	each	0	1	6
Electric Wire, high tension ...	per foot	0	0	8
„ „ low tension ...	„	0	0	3
Boron Battery, for charging accumulators		2	16	0
Horn	...	0	18	6
Dietz Side Lamps ...	... per pair	2	17	0
Lucas Petroleum Side Lamps ...	„	3	0	0
„ Large Head Lamp ...	each	8	0	0
„ Small „ „	„	7	5	0
Motor Grease	per lb.	0	0	6
Tyre Repair Outfit	...	0	12	6
Tyre Pump, with Pressure Gauge ...	...	1	5	0
Electric Torch	...	0	12	6
Refills for ditto	...	0	1	6
Veeder Odometer, small ...	...	0	11	6

We would respectfully ask our clients to pass all orders for repairs, etc., through the office, as, otherwise, we cannot undertake any responsibility.

LIST OF AGENTS.

Town.	*AGENTS.*	*Telegrams.*	*Telephones.*
ABERDEEN .	CLAUDE HAMILTON (ABERDEEN), LTD., 234, Union Street.	"Power, Aberdeen."	No. 582.
ABERYSTWITH	Mr. W. H. HOLLIER, Commerce House.		
ACCRINGTON	CROSSLEY MOTOR AGENCY, Clayton-le-Moors.	"Crossley, Clayton-le-Moors."	
ALNWICK . .	THE ALNWICK MOTOR GARAGE AND CYCLE CO., Market Street.	"Cycle Co., Alnwick."	
BARNSTAPLE	Messrs. S. J. BALE & CO., Trafalgar Cycle and Motor Works.	"Garage, Barnstaple."	No. 3Y.
BATH . . .	THE BATH GARAGE AND MOTOR CO., 11, Kingsmead Street.	"Garage, Bath."	No. 273.
BELFAST . .	THE NORTHERN MOTOR CO., LTD., Montgomery Street.	"Exactitude, Belfast."	No. 1402.
BRISTOL . .	THE BRISTOL WAGON AND CARRIAGE CO., LTD., 138, Victoria St.	"Wagon, Bristol."	No. 866.
BOLTON . .	BOLTON MOTOR CO., 121/123, St. George's Road.	"Repairs, Bolton."	No. 437.
BOSTON . .	Messrs. HOLLAND BROS., Bargate Motor and Cycle Works.	"Holland, Bros., Boston."	No. 0185.
BRIGHTON .	THE BRIGHTON AND SUSSEX MOTOR AND CARRIAGE WORKS, 29, King's Road.	"Petrol, Brighton."	No. 847.
BROSELEY .	JAMES DAVIES, King Street.		
CARDIFF . .	THE CARDIFF MOTOR GARAGE CO., 51, Queen Street.		No. 1203.
CARMARTHEN	D. E. JONES & CO., 51, King's Street.	"Bradbury, Jones, Carmarthen."	
CARDIGAN .	THE BRIDGE END FOUNDRY CO.	"Bridgend Foundry, Cardigan."	
CHELTENHAM	THE CHELTENHAM MOTOR CAR WORKS, 22, Clarence Street.		
CORK . . .	Messrs. B. COOKE & SONS, 32, Grand Parade.	"Cooke-Plumber, Cork."	No. 348.

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LIST OF AGENTS *continued.*

Towns.	*AGENTS*	*Telegrams.*	*Telephones.*
DARLINGTON	Messrs. COX-WALKERS, North-Eastern Electric Works.	"Cox-Walkers, Feetham, Darlington."	No. 87.
DARTMOUTH	Messrs. SIMPSON, STRICKLAND & CO.	"Engineers, Dartmouth."	No. 2 Nat. Dart.
DONCASTER	DONCASTER GARAGE, 58, Hall Gate.	"Motors, Doncaster."	No. 63.
DUBLIN	Messrs. J. HUTTON, SONS & CO., 115, Summer Hill.	"Motor, Dublin."	No. 514.
DUNDEE	Messrs. THOMAS SHAW, LTD., 32, Reform Street.	"Oriel, Dundee."	No. 1015.
FAVERSHAM	HAWKINS & SON, 81, Preston Street.		
GLASGOW	Messrs. RENNIE & PROSSER, 93-95, Mitchell Street.	"Pedals, Glasgow."	No. 06435 Nat. No. 588 Corp.
HANLEY	THE TELEGRAPH CYCLE AND MOTOR CO.		No. 43 Y2.
HARROGATE	Messrs. H. JOHNSON & CO., 28, Montpellier Parade.	"Automobile, Harrogate."	No. 47X.
EAST HARLING	Mr. J. N. C. RAY.	"Ray, East Harling."	
HORSHAM	Messrs. HULL & MAY, Carfax.		
KING'S LYNN	Messrs. W. H. JOHNSON & SONS	"Johnson, Cyclist, King's Lynn."	
KINGTON, Herefordshire	Mr. J. FRYER, Central Cycle Stores, High Street.	"Fryer, Kington."	
LINCOLN	Messrs. R. M. WRIGHT & CO., Newland.	"Stonebow, Lincoln."	No. 0177.
LLANDUDNO	Messrs. A. DEACON & SON.	"Deacons, Llandudno."	No. 0289.
LONDON	THE LACRE MOTOR CAR CO., LTD., Poland Street, Oxford Street.	"Unbaffled, London."	No. 1308 Gerrard.
LYNDHURST	THE IMPERIAL CYCLE AND MOTOR CAR CO.	"Imperial, Lyndhurst."	

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LIST OF AGENTS *continued.*

Towns.	*AGENTS.*	*Telegrams.*	*Telephones.*
NEWBURY .	Messrs. STRADLING & PLENTY.		
NEWCASTLE-ON-TYNE	Messrs. GEORGE & JOBLING, South Street.	"Motors, Newcastle."	No. 2012.
NEWTON-ABBOTT	Messrs. REEVE & CO., 21, Bank Street.		
NORTHAMPTON	Messrs. F. TAFFINDER & CO., Park Road, St. James End.	"Taffinder's Cycle Works, Northampton."	
NORWICH . .	HOWES & SONS, Chapel Field.	"Coach, Norwich."	No. 0679.
NOTTINGHAM	THE NOTTINGHAM AUTOCAR CO., Talbot Street.	"Autocar, Nottingham."	No. 1773.
PAIGNTON .	Mr. E. M. FAWCETT, New Street.		
PENISTONE .	Messrs. W. & G. LOCKLEY, Cycle and Motor Engineers, Cubley.	"Lockley, Penistone."	
PLYMOUTH .	Messrs. W. G. HEATH & CO., 10, Frankfort Street.	"Heath Engineers, Plymouth."	No. 682.
POOLE, Dorset	Messrs. WARN, KING & CO., 198, High Street, Longfleet.		No. 3583.
SALISBURY .	Messrs. ROWLAND & SONS, Castle Street.		
SHEFFIELD .	Messrs. T. HAIGH & Co., 52, West Street.	"Revolve, Sheffield."	
SHREWSBURY	Messrs. LEWIS & FROGGATT, 18, High Street.		
SOUTHAMPTON	Messrs. F. A. HENDY & CO., LTD., 10-11, East Street, and York Buildings.	"Hendy, Southampton."	No. 461.
SOUTHSEA .	Messrs. S. ROSE & Co., 43-45, Castle Road.	"Rose, Southsea."	No. 458.
STOCKTON-ON-TEES	Messrs. J. MCADAMS & CO., Yarm Lane.		No. 0296.
STONE, Staffs.	Messrs. EVANS & SONS, Motor Car Depot.		

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LIST OF AGENTS *continued.*

Towns.	*AGENTS.*	*Telegrams.*	*Telephones.*
ST. LEONARDS-ON-SEA	Messrs. SKINNER & CO.	"Skinner, St. Leonards."	No. 328.
SWINDON . .	THE SWINDON MOTOR ENGINEERING CO., Devizes Road, Old Swindon.	"Swindon, Electrical"; "Swindon, Wilts."	No. 472.
TRURO . .	Messrs. HICKS & CO., 10, River Street.		
WATERFORD	Mr. W. J. CORDNER.	"Cordner, Waterford."	No. 88.
WEXFORD .	Mr. ROBERT MAYNE, North Main Street.		
WINDERMERE	Mr. W. A. FELL, Bridge Iron Works.	"W. A. Fell, Windermere."	No. 4.
WOKING . .	Mr. J. COLMAN, Gabo Yard, Maybury Road.	"Colman, Woking."	
YEOVIL . .	Messrs. HILL & BOLL, Carriage Builders.	"Boll, Yeovil."	
YORK . . .	THE YORK COUNTY AND CITY GARAGE CO.		

SOUTH AFRICA . .	CARR BROS. & ASH, LTD.	Cape Town, Loop Street (P.O. Box 736). Port Elizabeth, Queen Street (P.O. Box 5). East London, Britannia Arcade (P.O. Box. 148).
NEW ZEALAND . .	Messrs. A. JONES & SONS, LTD., Hastings.	
PARIS . . .	Mr. GEORGE DE LA NEZIERE, 56, Rue Pergolese.	"Wolseley, Paris." No. 548, 42.
LISBON . .	Messrs. F. STREET & CO., Palacio da Flor da Murta.	"Electro, Lisbon." No. 646.

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